# Alberta Grizzly Bear Recovery Plan 2008-2013

**Alberta Species at Risk Recovery Plan No. 15**

Alberta

# Alberta Grizzly Bear Recovery Plan 2008-2013


Prepared by the Alberta Grizzly Bear Recovery Team:

**Lisa Wilkinson** (Co-chairman), Alberta Fish and Wildlife Division, SRD
**Gordon Stenhouse**, (Co-chairman), Foothills Model Forest
**Robert Barclay**, University of Calgary
**Rick Blackwood**, Alberta Sustainable Resource Development
**Rick Bonar**, Alberta Forest Products Association
**Andy Boyd**, Alberta Fish and Game Association
**Mark Boyce**, University of Alberta
**Darryl Carlson**, Western Stock Growers Association
**Mike Gibeau**, Parks Canada
**Dave Hobson**, Alberta Fish and Wildlife Division, SRD
**David Penner**, Federation of Alberta Naturalists
**Rob Staniland**, Canadian Association of Petroleum Producers
**Bill Tinge**, Alberta Sustainable Resource Development
**Kevin Williams**, Alberta Energy
**Peter Zimmerman**, Environmental Non-Government Organizations
(Alberta Wilderness Association, Grizzly Bear Alliance, Canadian Parks and Wilderness Society, Yellowstone to Yukon Conservation Initiative)



March 2008

Alberta

Publication No.I/297:
ISBN: 978-0-7785-7066-0 (Printed Edition) revised July 23, 2008 –erratum, page 10
ISBN: 978-0-7785-7067-7 (On-line Edition) revised July 23, 2008 –erratum, page 10
ISSN: 1702-4897 (Printed Edition)
ISSN: 1702-4900 (On-line Edition)

Cover photos: Gordon Court

For copies of this report visit our web site at:

http://www.srd.gov.ab.ca/fishwildlife/speciesatrisk/default.aspx

Or contact:

Information Centre – Publications
Alberta Sustainable Resource Development
Main Floor, Great West Life Building
9920 – 108 Street
Edmonton, Alberta, Canada T5K 2M4
Telephone: (780) 944-0313 or 1-877-944-0313

This publication may be cited as:

Alberta Grizzly Bear Recovery Plan 2008-2013. 2008. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Recovery Plan No. 15. Edmonton, AB. 68 pp.

## PREFACE

Albertans are fortunate to share their province with a diverse variety of wild species. Populations of most species of plants and animals are healthy and secure. However, a small number of species are either naturally rare or are now imperilled because of human activities. Recovery plans establish a basis for cooperation among government, industry, conservation groups, landowners and other stakeholders to ensure these species and populations are restored or maintained for future generations.

Alberta's commitment to the *Accord for the Protection of Species at Risk* and to the *National Framework for the Conservation of Species at Risk*, combined with requirements established under Alberta's *Wildlife Act* and the federal *Species at Risk Act*, has resulted in the development of a provincial recovery program. The overall goal of the recovery program is to restore species identified as *Threatened* or *Endangered* to viable, naturally self-sustaining populations within Alberta.

Alberta species at risk recovery plans are prepared under the supervision of the Fish and Wildlife Division, Alberta Sustainable Resource Development. These recovery plans are prepared by recovery teams composed of a variety of stakeholders including conservation organizations, industry, landowners, resource users, universities, government agencies and others. Membership is by invitation from the Director of Wildlife Management, and includes representation from the diversity of interests unique to each species and circumstance. Conservation and management of these species continues during preparation of the recovery plan.

These plans are provided by the recovery team as advice to the Minister responsible for fish and wildlife management (the Minister) and to all Albertans. Alberta's Endangered Species Conservation Committee reviews draft recovery plans, and provides recommendations to the Minister. In addition, an opportunity for review by the public is provided. Plans accepted and approved for implementation by the Minister are published as a government recovery plan. Approved plans are a summary of the Department's commitment to work with involved stakeholders to coordinate and implement conservation actions necessary to restore or maintain these species.

Recovery plans include three main sections: background information that highlights the species' biology, population trends, and threats; a recovery section that outlines goals, objectives, and strategies to address the threats; and an action plan that profiles priority actions required to maintain or restore the *Threatened* or *Endangered* species. These plans are "living" documents and are revised as conditions change or circumstances warrant. Each approved recovery plan undergoes an annual review, and progress of implementation is evaluated. Implementation of each recovery plan is subject to the availability of resources, from within and from outside government.

## TABLE OF CONTENTS


PREFACE ____ iv

LIST OF FIGURES ____ vii

LIST OF TABLES ____ vii

LIST OF APPENDICES ____ vii

ACKNOWLEDGEMENTS ____ viii

EXECUTIVE SUMMARY ____ ix

1.0 INTRODUCTION ____ 1

1.1 Species Status ____ 1

1.2 Recovery Team ____ 1

1.3 Public Involvement ____ 2

1.4 Other Considerations for Grizzly Bear Conservation ____ 2

1.5 Current Grizzly Bear Conservation Actions in Alberta ____ 3

2.0 SPECIES BIOLOGY IN ALBERTA ____ 4

2.1 Description and Life History ____ 4

2.2 Habitat ____ 5

2.3 Historical and Current Distribution ____ 5

2.4 Population Size and Trends ____ 7

3.0 THREATS ____ 7

3.1 Human-Caused Mortality ____ 7

3.2 Habitat Alteration and its Effects ____ 13

3.3 Cumulative Effects ____ 14

4.0 RECOVERY PLAN PRINCIPLES, FEASIBILITY, CHALLENGES, AND OPPORTUNITIES ____ 18

4.1 Guiding Principles for Recovery ____ 18

4.2 Feasibility of Recovery ____ 18

4.3 Knowledge Gaps ____ 19

4.4 Potential Conflicts, Challenges, and Opportunities ____ 20

5.0 RECOVERY GOAL AND OBJECTIVES ____ 20

5.1 Goal ____ 20

5.2 Objectives ____ 20

6.0 RECOVERY STRATEGIES ____ 26

6.1 Reduce Human-caused Mortality of Grizzly Bears ____ 26

6.2 Improve Knowledge of Grizzly Bears 27
6.3 Reduce Human/Bear Conflicts 28
6.4 Improve and Deliver Education and Outreach Programs to Enhance Grizzly Bear Conservation 28
6.5 Identify, Track, and Maintain Habitat for Grizzly Bears 29
6.6 Improve Inter-jurisdictional Cooperation 29
6.7 Improve and Apply Regulations and/or Legislation for Recovery Implementation 30
7.0 RECOVERY ACTIONS 31
7.1 Reduce Human-caused Mortality of Grizzly Bears 31
7.2 Improve Knowledge of Grizzly Bears 31
7.3 Reduce Human/bear Conflicts 32
7.4 Improve and Deliver Education and Outreach Program 34
7.5 Identify, Track, and Maintain Habitat for Grizzly Bears 34
7.6 Improve Inter-jurisdictional Coordination 34
7.7 Improve and Apply Regulations and/or Legislation for Recovery Implementation 35
8.0 IMPLEMENTATION SCHEDULE AND COSTS 39
9.0 RECOVERY PLAN MONITORING AND EVALUATION 42
9.1 Progress Reporting 42
9.2 Recognized Challenges for Recovery Actions 43
10.0 REFERENCES 44
11.0 Glossary 50
APPENDICIES 52

## LIST OF FIGURES

Figure 1. Current grizzly bear range in Alberta. 6

Figure 2. Types of mortality of grizzly bears in Alberta as A) a percentage of total known mortality, 1990 to 2003, and B) a percentage of total known and assumed mortality, 1990 to 2003. 8

Figure 3. Percentage by sex of total known mortality (including hunting), 1990 – 2006. 10

Figure 4. Total mortality from regulated harvest, 1990-2007. 20

Figure 5. Total known unregulated mortality, 1990-2007 11

Figure 6. Number of illegal, self-defence and licensed hunting mortalities by month, 1990-2007 12

Figure 7. Number of grizzly bears (including cubs) relocated in Alberta by year, 1990-2006. 13

## LIST OF TABLES

Table 1. Regional grizzly bear issues 16

Table 2. Guidelines for access and land use inside Grizzly Bear Priority Areas and Dispersal Zones 35

Table 3. Recovery action implementation schedule and costs 38

Table 4. Human resources needed for recovery implementation 40

## LIST OF APPENDICES

Appendix 1. Recovery Achievement and Hunting Resumption 52
Appendix 2. Regional Grizzly Bear Recovery Implementation Teams 54
Appendix 3. Example of Grizzly Bear Priority Area (GPA) delineation 57
Appendix 4. Current and proposed Bear Management Areas (BMAs) within grizzly bear range 61
Appendix 5. Schedules for inventory and habitat mapping 62
Appendix 6. Grizzly bear conflict and mortality rates by Wildlife Management Unit (WMU), 1990-2003 63
Appendix 7. Example of Attractant Storage Order 64
Appendix 8. Summary of proposed OHV rule in USA (July 2004) 65
Appendix 9. Detailed schedule of high priority actions 66
Appendix 10. DNA Census Results 2004-2006 67

## ACKNOWLEDGEMENTS

We are grateful to the agencies and organizations that allowed their representatives to participate on the Grizzly Bear Recovery Team, which was a significant time commitment. Some of these agencies also covered travel expenses for their representatives. Sustainable Resource Development provided funding and administrative support for the Recovery Team.

Numerous individuals from the agencies and organizations represented on the Recovery Team provided considerable time to contribute information and review draft versions of the Recovery Plan. Michael Proctor, Chris Servheen, Carita Bergman, and Kim McAdam made valuable presentations to the Team. In the early stages of Recovery Plan development, Karen Graham recorded meeting minutes and provided valuable assistance with initial Plan framework and content. Jerome Cranston aided in the preparation on maps and figures and provided GIS support for numerous tasks during preparation of this plan. Dr. Chris Servheen and Dr. Charles Schwartz provided excellent review comments and suggestions which have strengthened the final recovery plan presented here. The Team also acknowledges Sue Cotterill for guidance on Recovery Plan development and editorial reviews.

## EXECUTIVE SUMMARY

In 2002, the Endangered Species Conservation Committee recommended that the Alberta grizzly bear population be designated as *Threatened*. This recommendation was based on the grizzly bear's small population size, slow reproductive rate, limited immigration from populations outside Alberta, and increasing human activity on the landscape. Based on recent estimates of grizzly bear mortality rates, there is concern that the population may be in decline. The Recovery Team believes that there is sufficient habitat in Alberta to increase the grizzly bear population and recommends ways to reduce grizzly bear mortality.

Human causes, primarily licensed hunting and illegal and self-defence kills, are the main sources of grizzly bear mortality in Alberta. Illegal and self-defence kills are linked to increasing human activity in grizzly bear range, particularly where access (motorized vehicle routes) has also increased. Furthermore, increasing human activity can increase human/bear conflicts, which in turn may increase bear mortality rates. Types of conflict vary across the province based on varying human activity and landscapes. Consequently, this recovery plan focuses on ways to reduce human-caused mortality of grizzly bears with an emphasis on regional application of recovery actions.

Currently, there is no reliable grizzly bear population size estimate in Alberta. Determining the provincial population size, based on censuses of individual Bear Management Areas, is a priority for recovery. Understanding the population size, and ultimately population trends, will help direct recovery efforts and evaluate recovery success. Improving knowledge about grizzly bears in Alberta, particularly in relation to human activities on the landscape, is a recovery objective that needs to be implemented concurrently with reducing human-caused mortality of grizzly bears.

The Recovery Plan has established a goal of achieving a self-sustaining population of grizzly bears over the long term. The Plan details how recovery is achievable, and considers feasibility of recovery from biological, technical and social perspectives. Societal considerations are an integral part of grizzly bear recovery, not only because the root cause of grizzly bear mortality is human activity, but because people's views of grizzly bears will ultimately play a large role in determining the success of grizzly bear recovery.

The Recovery Plan outlines actions to be implemented during the next five years. The Recovery Team will evaluate achievement of recovery objectives annually, and adjustments to recovery actions will be made accordingly. Recovery is a dynamic process which follows an adaptive management paradigm. Consequently, the Recovery Plan is a dynamic document which needs to be updated according to implementation of recovery actions and their success or failure, and to reflect development of new tools and acquisition of new data. The Recovery Team recognizes that this plan is the first iteration, and the first step, in the recovery process. After five years, the plan will be thoroughly reviewed, at which time a reliable population estimate and population target for recovery should be available to help refine recovery objectives and actions.

Data and analysis presented in this document were current at the time of preparation of this document (December 2005).

Key recommendations of this recovery plan include:

- Reduce human-caused grizzly bear mortality by changing human-use of the landscape, including:
  - Controlling access development and use, and other human activities in grizzly bear habitat
  - Temporary suspension of hunting as an immediate measure while other recovery actions are implemented
- Determine grizzly bear population size and continue ongoing collection and monitoring of key data
- Create Grizzly Bear Priority Areas in each population unit to protect high quality habitat and reduce risk from humans
- Reduce human/bear conflicts by working with people and managing attractants to minimize adverse bear behaviour
- Develop an education program directed at the general public and target audiences
- Maintain current grizzly bear distribution, track availability of suitable habitat, and enhance habitat where appropriate
- Establish regional grizzly bear recovery implementation teams to address regional issues
- Improve inter-jurisdictional cooperation and grizzly bear data management
- Improve regulations and/or legislation to support recovery actions
- Acquire new funding to support additional government staff (create a grizzly bear recovery coordinator position, enforce regulations regarding attractant storage and access use, support conflict management and education, support ongoing inventory and habitat mapping, and assist with integration of grizzly bear conservation needs into land use planning and land use decisions)
- Involve land users and stakeholders in implementation of the recovery plan, including improved communication with, and compensation for, ranchers.

# 1.0 INTRODUCTION

## 1.1 Species Status

The national status of grizzly bears (*Ursus arctos*) in Canada was reviewed by COSEWIC in May 2002 and the species was recommended to be of *Special Concern* (Ross 2002). Reasons for this recommendation included concern for the potential of expanding industrial, residential and recreational development into grizzly bear habitats across the country, habitat and population fragmentation occurring in the southern part of grizzly bear range in Canada, and life history characteristics that make grizzly bears sensitive to human-caused mortality.

In Alberta, the grizzly bear is considered a species that *May be at Risk* of extinction or extirpation at the general status level (Alberta Sustainable Resource Development 2007). The provincial ranking system identifies species that should be considered for designation as species as risk under the Wildlife Act, and is reviewed every five years. The Alberta Endangered Species Conservation Committee (ESCC) conducted a detailed assessment of the Alberta grizzly bear population in 2002 and forwarded a recommendation to the Minister of Sustainable Resource Development (hereafter referred to as the Minister) that the grizzly bear be listed as *Threatened* under the Wildlife Act (this recommendation is currently under consideration). The recommendation was based on the small population of grizzly bears in Alberta, which is further limited by a slow reproductive rate, limited immigration from populations outside Alberta, and increasing alteration of habitat.

In adjacent jurisdictions, grizzly bear status varies, but is not considered secure. In British Columbia, the Yukon, and the Northwest Territories, grizzly bears are recognized as being sensitive to human activities or natural events and may require special attention to prevent them from becoming at risk (Government of British Columbia 2003, Government of Yukon 2001, Government of Northwest Territories 2000). The grizzly bear is *Extirpated* in Saskatchewan and *Threatened* in the United States.

## 1.2 Recovery Team

The Alberta Grizzly Bear Recovery Team (hereafter referred to as the Team) was initiated by the Minister, on whose behalf the Director of Wildlife Management provides guidance and approval. The primary responsibility of the Team is to provide recommendations for recovery in an Alberta Grizzly Bear Recovery Plan (hereafter referred to as the Plan), outlining recovery strategies and actions. The Team assists the Minister and the Alberta Fish and Wildlife Division (FWD) with Plan implementation by facilitating and encouraging involvement of appropriate and interested parties. The Team is also responsible for updating the Plan, and evaluating and reporting on the progress of recovery actions.

The Plan is a dynamic document. The initial life span of the Plan is five years, during which the Team will meet at least annually to review and update the Plan as required. At the end of five years the Plan will be assessed to determine if the Goal and Objectives are being achieved.

The Team is a multi-stakeholder group designed to represent a range of interests within Alberta. The Team consists of members from the following organizations: Alberta Energy, Alberta Fish and Game Association, Alberta Forest Products Association (AFPA), Alberta Sustainable Resource Development, Canadian Association of Petroleum Producers (CAPP), Federation of Alberta Naturalists (FAN), Parks Canada, University of Alberta, University of Calgary, Western Stock Growers Association and Environmental Non-government Organizations. All First Nations bands in Alberta were invited to provide input on Plan development, and three bands responded. The Team began meeting in October 2002.

## 1.3 Public Involvement

In addition to having representation from a range of interests on the Team, public involvement was invited through a media release on the government web page in February 2003. Grizzly bear management in Alberta continues to attract a great deal of attention, and public input on grizzly bear conservation will continue to be welcomed.

## 1.4 Other Considerations for Grizzly Bear Conservation

In general, because large predators have relatively large home ranges, maintaining their habitat and landscape linkages may result in habitat maintenance for numerous other species on the landscape. In this context, grizzly bears can be considered an "umbrella species". Caro (2003) concluded that umbrella species are a useful tool in reserve designation, in part because habitat requirements are large, and as a result, many other species are protected. Although caution should be taken with this approach because some species require different spatial configurations and habitat types compared with those of large carnivores, the long-term persistence of grizzly bear populations in combination with other large predators could be used as a barometer with which to measure current and historic land-use practices and sustainable resource management practices.

Conservation of grizzly bears is not only about restoring and maintaining the biological requirements of a species, it is also about people's values, and their beliefs about bears and science, and what they expect and demand from land-use policies. To some, grizzly bears symbolize wilderness, our abundant natural heritage, and an economic opportunity. For others, grizzlies symbolize our struggle to tame the land, loss of opportunity, economic hardship, and can engender fear and anxiety. Positive or negative, the grizzly bear is a potent and recognizable icon that elicits strong emotional responses. Differences in values and attitudes may be couched as arguments about scientific knowledge or land-use practices.

There is strong economic and social pressure in Alberta to use and develop land for various resource developments, recreation, and other activities in grizzly bear range. Society's demand for these lands and resources is not likely to decrease, and in most cases will increase. However, there is also growing social support for grizzly bear conservation. If grizzlies are to remain viable on the landscape, it is necessary to develop and implement methods that will minimize and effectively manage the impact of human activities on grizzly bears and their habitat. Society will

ultimately determine the concessions made between human use of the landscape and the demand for a healthy grizzly bear population in the province.

## 1.5 Current Grizzly Bear Conservation Actions in Alberta

The provincial government has implemented several steps to improve grizzly bear conservation, many of which have been initiated within the last two years, in response to the initiation of the Recovery team and recommendations from the ESCC.

- Maximum fines for grizzly bear poaching have increased to $100,000.00 from $5,000.00 (2003).
- Hunting: While it is recognized that regulated hunting of grizzly bears is one source of total human caused mortality, wildlife managers have reduced the number of grizzly bear hunting licenses in recent years. In addition some Bear Management Areas (BMAs) were closed to grizzly bear hunting, and the length of the hunting season was reduced (2003, 2004, and 2005). In 2006 the Minister of Sustainable Resource Development announced a three-year moratorium on grizzly bear hunting in Alberta.
- In 2004, SRD completed a DNA analysis of available tissue samples to better delineate grizzly bear population units (BMAs) in Alberta. This work has been completed and population units have been delineated south of Highway 16.
- Based on this genetic analysis, DNA population censuses were conducted in three of the newly delineated population units (2004, 2005, and 2006, respectively). Field work has been completed for a fourth area, and a fifth area is scheduled to be censused in 2008.
- SRD continues to provide financial support and a staff biologist to lead the Foothills Model Forest Grizzly Bear Research Project, which is continuing efforts to assemble provincial grizzly bear habitat maps, develop RSF models, and conduct other related activities. This project is seen as the delivery and coordination mechanism for provincial grizzly bear research activities.

Some actions require additional work and resources to ensure their success (refer to Actions for further details):

- A Bear Smart Communities Program was initiated to help educate individuals and communities about living with bears and issues around attractants (2004).
- Aversive conditioning (various techniques) is ongoing in Kananaskis Country to reduce bear-human conflicts.
- South-west Alberta Grizzly Strategy (SWAGS) has been ongoing since 1999, and includes a DNA inventory, spring intercept feeding, aversive conditioning, problem bear monitoring, habitat securement, conflict prevention and education.
- Plans to continue DNA population censuses in all remaining BMAs.

## 2.0 SPECIES BIOLOGY IN ALBERTA

### 2.1 Description and Life History

Grizzly bears are larger than black bears, have pelage ranging from blonde to brown, and have a distinctive shoulder hump and facial disk. Males are larger than females, weighing 200-300 kg and 100-200 kg respectively.

Grizzly bear populations are limited by a slow reproductive rate; they take several years to reach maturity, have small litter sizes, and have a long interval between litters. In Alberta, females produce a first litter between 4 and 8 years of age (Herrero, 1978, Garshelis *et al.* 2003). Mean litter size ranges from 1.4 to 2.2 cubs per litter (Nagy and Russell 1978, Russell *et al.* 1979, Nagy et al. 1989, Garshelis *et al.* 2003) and mean interval between litters ranges from 3 to 4.4 years (Nagy and Russell 1978, Nagy *et al.* 1989, Garshelis *et al.* 2004). Cubs are born in the den in January or February and remain with their mother for two to five years.

Grizzly bears have the basic digestive anatomy and physiology of other carnivores, but have an omnivorous diet (Ross 2002). Their natural diet includes grasses, sedges, forbs, roots, berries, nuts, fish, carrion, rodents, ungulates, birds, and insects (Mealey 1975, Nagy and Russell 1978, Hamer *et al.* 1981, Servheen 1985, Nagy *et al.* 1989, McLellan and Hovey 1995). Grizzlies also share habitat with humans and may include garbage, livestock, and grains in their diet. Preferences for food items vary with location and season (especially during fall when high energy food is necessary), but in general, plants are their main food source (Ross 2002). Grizzly bears cover large areas in search of food and often return to good foraging areas on a seasonal basis (Pearson 1975, Russell *et al.* 1979).

Multiple food sources must be available within a home range to compensate for major fluctuations in food availability that occurs within and among years, and consequently grizzly bears have large home ranges (Russell *et al.* 1979, Gibeau and Stevens 2003, Stenhouse *et al.* 2003a). The size of the home range is influenced by sex (Gau 1998, McLoughlin *et al* 1999), age, and reproductive status of the animal, as well as by availability and distribution of food (McLoughlin *et al.* 2000) and population density (Nagy and Haroldson 1990). Female home ranges are typically smaller than male home ranges. In Alberta, annual home ranges for female grizzly bears ranged from 152 to 2932 $km^2$, and for males from 501 to 4748 $km^2$ (Eastern Slopes Grizzly Bear Project unpubl. data, Foothills Model Forest unpubl. data). Grizzly bears that live in areas with predictably abundant, high-quality food usually have smaller home ranges compared with grizzly bears that live in colder and drier areas where food is less abundant (Ross 2002).

Human-caused mortality is the greatest source of mortality for grizzly bears; estimates of natural mortality (malnutrition, predation, disease and accidents) from various studies in the Rocky Mountains are low, accounting for less than 10% of known mortality (Benn 1998, Craighead *et al.* 1988, but see McLellan *et al.* 1999). During five years of the northern east slopes grizzly bear study, there were 29 recorded mortalities, none of which were attributed to natural causes (Stenhouse *et al.* 2003a). In Alberta, deaths resulting from natural causes made up 0.3% of known mortalities during 1972 to 2005 (Alberta Fish and Wildlife, unpubl. data). Malnutrition

and predation are the most common causes of natural mortality, especially among dependant young bears (Nagy *et al.* 1983, Knight and Eberhardt 1985).

## 2.2 Habitat

Grizzly bears require large, diverse areas because no single habitat type can provide all necessary resources, the availability of which changes with season and year. Although grizzly bears occupy open habitats, vegetative cover is needed for resting and cooling, and importantly, can minimize observations by humans (and consequently may reduce the potential for human-caused mortalities). Refer to "Threats" for further information on the influence of human activities on grizzly bear habitat use and survival.

Identifying and defining grizzly bear "movement corridors or pathways" has been the subject of conservation biology research for many years. Locally, grizzly bears use corridors to move through their home ranges. At a larger scale, juvenile bears use corridors to disperse and establish new home ranges. Relative to females, juvenile males tend to disperse farther over a longer period of time, taking up to four years to establish a home range (McLellan and Hovey 2001). Landscape conditions for movement and dispersal, although not fully understood, appear to be important in determining use and occupancy by grizzly bears.

Availability of den sites is currently not considered a limiting factor, but females often return to the same area to den, and occasionally reuse the same den (Russell *et al.* 1979, Foothills Model Forest, unpubl. data). Dens are typically in areas of deep snowfall, in natural caves, under roots of trees, or excavated on slopes. Den entry and emergence time vary with region, year, and sex, with pregnant females usually entering their dens first and emerging later than males (Ross 2002).

Throughout the Plan, the term high quality grizzly bear habitat is used to describe areas that, primarily, have a range of suitable forage plants (spatially and temporally). In addition, these areas provide cover and landscape conditions for movement corridors, dispersal, and denning.

## 2.3 Historical and Current Distribution

Grizzly bears once roamed extensively across much of North America and Eurasia. In North America, they occurred from the Arctic to Mexico and from the Pacific coast to the Mississippi River (Banci 1991, Matson and Merrill 2002). Today, grizzly bears are extirpated from most of these areas and now occur in the Arctic, western Canada and the north-western United States (Kansas 2002, Matson and Merrill 2002, Ross 2002).

Grizzly bears once ranged throughout Alberta but now are extirpated from or transient within a large portion of their former range, primarily as a result of the impacts of roads, farming, ranching, settlements, and "control" measures (Alberta Fish and Wildlife Division 1990). Currently, grizzly bears are found in the Rocky Mountains and foothills, as far south as the United States border, and in the boreal forest from the British Columbia border to as far east as

High Level, Peace River, Red Earth, and Slave Lake (Figure 1). Grizzly bear range is based on occupancy by reproductive females; individual grizzly bears are occasionally observed outside of this range.

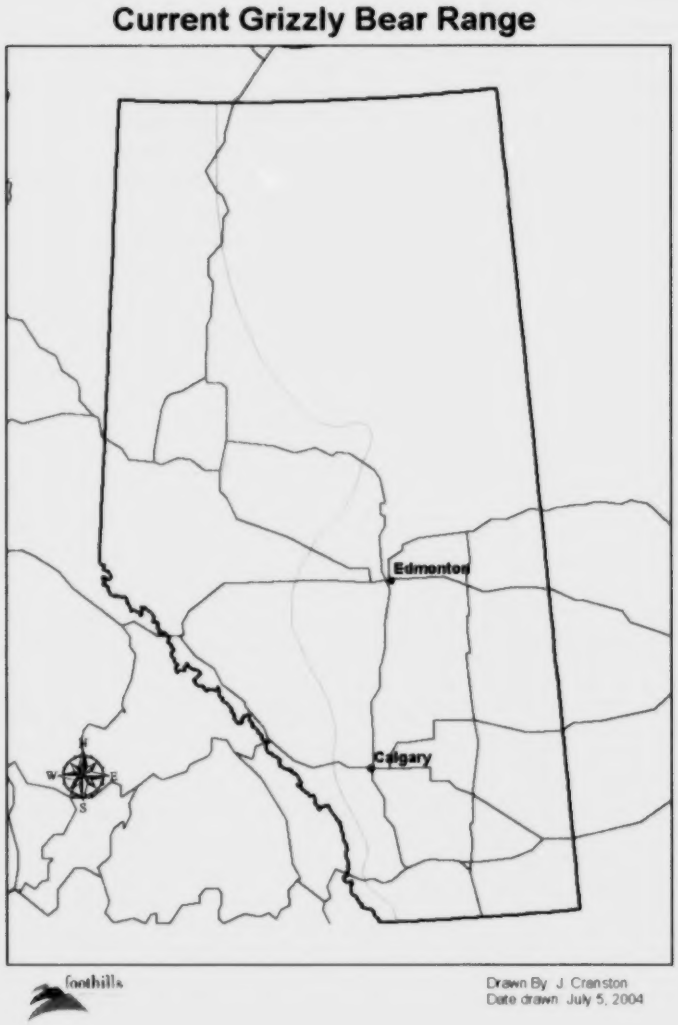



Figure 1. Current grizzly bear range in Alberta.

## 2.4 Population Size and Trends

A recent review of harvest allocation found that previous calculations used to predict provincial grizzly bear population size required review and modification to more accurately reflect the most current state of knowledge (Stenhouse *et al.* 2003b). An allocation model that had been used previously by Alberta Fish and Wildlife was improved, but an accurate population estimate was still not possible due to poor input data; current census data are needed. The amended model suggests that some local Alberta grizzly bear populations are likely in decline.

This review emphasizes that determining population size of grizzly bears is difficult, and is a challenge faced by other jurisdictions. In the absence of an empirically based estimate, and for the purpose of evaluating current mortality numbers, provincial grizzly bear experts (M. Boyce, M. Gibeau, and G. Stenhouse) were asked to estimate a provincial population size in 2004. These scientists concluded that based on studies within Alberta, the weight of evidence suggests a provincial population including national parks of less than 700 grizzly bears, and agreed that Alberta has the habitat resources to support a larger population to recover the species. This population estimate has been generated as a temporary, working number for the purpose of the Plan; one of the objectives of the Plan is to improve data collection to generate a reliable provincial population size estimate and goal. Work on this topic has been underway annually since 2004, as recommended in identified recovery actions listed in Table 3. Recent DNA-based population inventory work (Boulanger *et al.* 2004 and Boulanger *et al.* 2005) in two BMA's indicate that population levels in some management units are lower than previously suggested (see Appendix 10 for 2004-2006 DNA census results).

# 3.0 THREATS

Threats, or limiting factors, are conditions that alter population size by reducing survival or reproductive success. These factors can work directly such as bear mortality from hunting or disease, or indirectly, such as human use of access, which may increase human-caused mortality. An understanding of these factors is important because they identify mechanisms through which grizzly bear recovery may be achieved. The limiting factor analysis presented below is based on data from 1990 to 2003 (Alberta Fish and Wildlife Division 2003). The first Alberta grizzly bear management plan was created in 1990, so mortality data prior to this time are not reflective of current management regimes. Most statistics presented in this section are independent bears and do not include cubs and dependant young.

## 3.1 Human-Caused Mortality

Humans are the main source of known grizzly bear mortality in Alberta: however it is difficult to document all deaths because some are not reported. Research-based assumptions are used to account for unreported mortality. McLellan *et al.* (1999) found that in remote areas with hunting, up to 30% of grizzly bear deaths were unreported, but in less remote areas without hunting, approximately 50% of grizzly bear deaths were unreported. It is important to recognize

that reference to known mortality rates throughout this document is likely an underestimate of actual mortality. Previous research (Blanchard and Knight 1995) has shown that relocated grizzly bears have an increased rate of mortality of approximately 30%. Figure 2 illustrates the breakdown of types of human-caused mortality based on known mortalities (A), and including estimates of assumed mortalities (B) based on McLellan *et al.* (1999) and including a 30% mortality rate of relocated bears and 15% rate mortality from wounding (estimate based on review of big game wounding losses; Straley 1968, Boyce 1989).

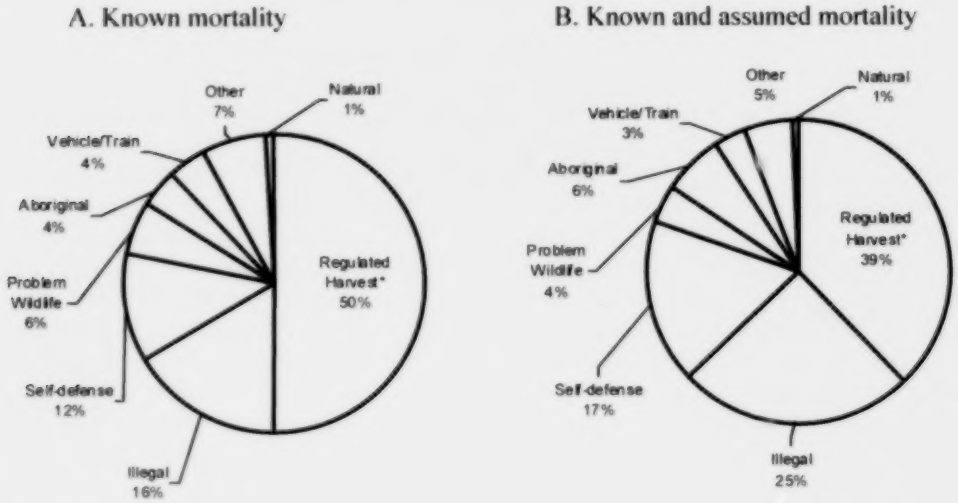



Figure 2. Types of mortality of grizzly bears in Alberta, 1990-2007, as A) a percentage of total known mortality, 1990 to 2003, and B) a percentage of total known and assumed mortality.

*Regulated harvest suspended in 2006.

There is variability around grizzly bear mortality rates (i.e., a percentage of the population) that will allow long-term survival of grizzly bear populations. Recent calculations (McLoughlin 2003) suggest that previous estimates of sustainable mortality rates were too high to allow a sustainable population (e.g., Miller 1990). McLoughlin (2003) used a population viability analysis to estimate that, in optimal and moderate habitat respectively, 4.9% and 2.8% are acceptable levels of total human-caused mortality. After examining the risks of population decline in 10 grizzly bear populations in British Columbia, McLoughlin (2003) cautioned that unless other sources of mortality could be reduced, a harvest reduction was advisable, especially in the absence of reliable population estimates.

Theoretically, to accommodate the observed and estimated mortality rates in Alberta, and ensure that these rates are below 4.9%, the population would have to be above 1000 (this estimate was based on average mortality from the last five years and calculating the population size at which the mortality equalled 4.9% of the population). This also assumes no immigration of bears from neighbouring jurisdictions. Assuming 700 independent bears, the mortality rate would be in excess of 6.7%. If the population were less than 700 bears, the mortality rate would be higher.

This analysis suggests that the Alberta grizzly bear population could be at risk of decline; however, determining the actual population size, and the level of connectivity with neighbouring jurisdictions, will ultimately determine the level of this risk.

Grizzly bear mortality has been linked to proximity to roads. Roads and other access corridors increase the frequency of contact between humans and bears, which can lead to increases in human-caused bear mortality – **human use of access (specifically, motorized vehicle routes) is one of the primary threats to grizzly bear persistence**. In the Alberta Central Rockies Ecosystem, 89% of human-caused mortalities (n=172) were within 500 m of a road on provincial lands, and in National Parks 100% of human-caused mortalities, mainly management removals and vehicle collisions, (n=95) were within 200 m of a road or trail (Benn 1998). In the northern east slopes of Alberta, female grizzly bears spent more time close to roads than males, and had a higher level of mortality (Foothills Model Forest, unpubl. data). Other studies also found that the majority of human-caused mortality, including hunting, occurred near roads (McLellan and Mace 1985, Dood *et al.* 1986, Horejsi 1986, Aune and Kasworm 1989, Knick and Kasworm 1989, Nagy *et al.* 1989, Titus and Beier 1992, Mattson *et al.* 1996).

Amount of human use in an area, which is usually related to amount of access, can affect grizzly bear health and survival. Grizzly bear mortality has been correlated with road density; more roads usually equate to more human use. Ruediger (1996) suggested that high road densities could create mortality sinks for grizzly bears, and in the northern east slopes, grizzly bear survival rates decreased with increasing road densities (Stenhouse et al. 2003a). Grizzly bears may avoid areas of extremely high human use because of the disturbance (Nielsen et al. 2004a). In some jurisdictions, distance from roads is used to evaluate habitat suitability for grizzly bears (Puchlerz and Servheen 1998, Gibeau 2000). Roads on which there is little or no human use represent low disturbance and low risk of mortality to bears.

3.1.1 Legal Harvest

Legal harvest includes A) Licensed Hunting and B) First Nations Hunting.

A) Licensed Hunting

Licensed hunting accounted for the majority of known and estimated grizzly bear mortalities in Alberta (1990-2007, Figure 2). Licensed hunting was suspended in 2006 and does not include bears hunted by First Nations.

In Alberta, the management plan set in 1990 attempted to restrict the number of licensed hunted bears to 2% of the provincial population. Once the provincial population had reached 1,000 individuals, the licensed harvest rate was to be increased to 4% of the population. Total known human-caused mortality was not to exceed 6% of the population, and females were to constitute only 35% of these individuals (Alberta Fish and Wildlife Division 1990). However, Harris (1986) recommended that the proportion of females not exceed 30%. In Alberta, females constituted an average of 32% of total hunting mortality (Figure 3).

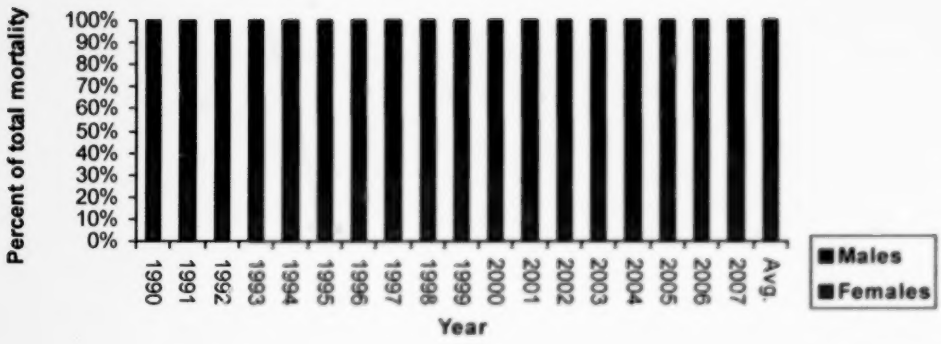



Figure 3. Percentage by sex of total known mortality (including hunting), 1990 – 2007.

The number of grizzly bear deaths from licensed hunting has remained relatively stable since regulatory changes in 1990 (Figure 4). This does not necessarily mean that the rate of licensed hunting mortalities has remained constant. If the number of grizzly bear deaths due to licensed hunting remains steady while the population changes, the rate of licensed hunting mortality will also change.

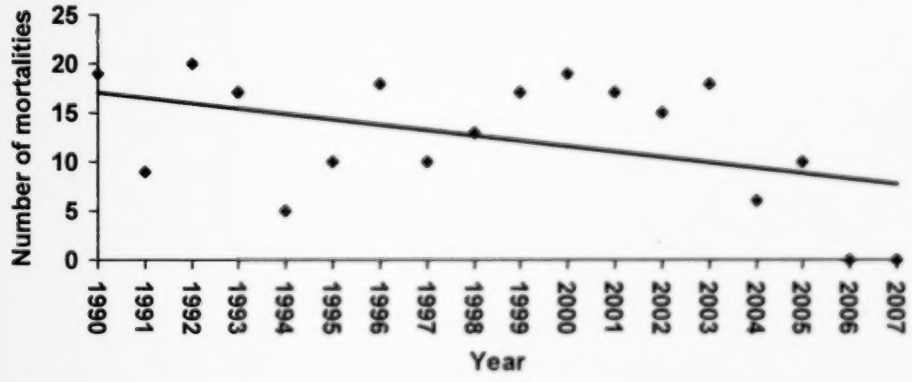



Figure 4. Total mortality from regulated harvest*, 1990-2007.
* Regulated harvest suspended in 2006.

B) First Nations Hunting

Grizzly bears killed by First Nations accounted for 6.0% of known bear mortalities between 1990-2007, through hunting, self-defence, and problem bear management. Because there is no legal requirement for First Nations to report grizzly bear mortalities, this likely under-represents the actual value. ***** [ERRATUM: The Recovery Team's assessment of legal reporting requirements is not correct. Mandatory reporting of grizzly bear kills applies to everyone.]****** There is also regional variation; for example, between 1993 and 2002, in the Bow River Watershed, First Nations accounted for 20.5% of known mortality (Gibeau and

Stevens 2003), which is above the provincial average of 4.5%. Grizzly bear kills by First Nations can be a significant mortality factor in some areas.

3.1.2 Unregulated Mortality

Since 1990, the number of mortalities from unregulated causes (illegal kills, self-defence, problem wildlife, vehicle/train collisions and other) has been roughly stable, with a peak between 1999 and 2003.

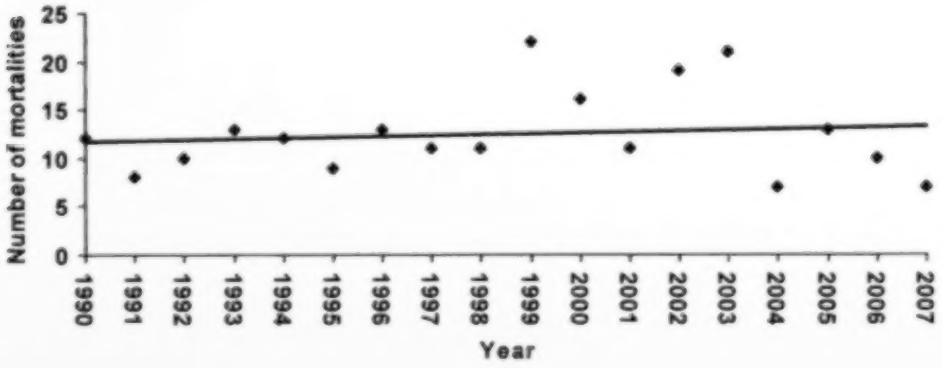



Figure 5. Total known unregulated mortality, 1990-2007.

A. Illegal Kills

Grizzly bears killed illegally (i.e., poaching) accounted for the greatest percentage of known and estimated unregulated mortalities (1990-2007, Figure 2). This figure underestimates the actual percentage of illegal kills because many of these deaths go unreported (McLellan *et al* 1999). The highest rates of known illegal kills occurred during the fall ungulate hunting season (69% of total annual illegal kills occurred in September, October, and November combined, Figure 6).

B. Self-Defence

Grizzly bear deaths in which the rationale was self-defence from a perceived or real threat accounted for the second greatest percentage of known and estimated mortalities (1990 – 2007, Figure 2). The highest rates of self-defence killings occurred during the fall ungulate hunting season (73% of total annual self defence kills occurred in September, October and November combined, Figure 6). In the Bow River watershed between 1993 and 2002, all self-defence kills were attributed to ungulate hunters encountering grizzly bears (Gibeau and Stevens 2003).

Both illegal and self-defence kills show a bi-modal annual pattern with peaks during the spring bear hunting season and the fall ungulate hunting season (Figure 6). Illegal and self-defence kills are the primary types of unregulated human-caused mortality.

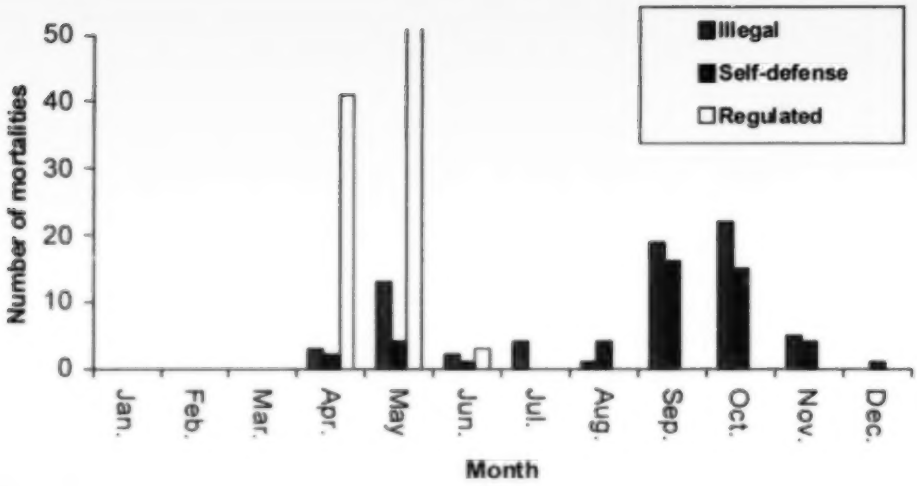



Figure 6. Number of illegal, self-defence and regulated harvest mortalities by month, 1990 – 2007.

* Regulated harvest suspended in 2006.

C. Problem Wildlife (Agency Control)

On provincial lands, Alberta Fish and Wildlife Division are responsible for managing "problem bears" (bears considered to be a threat to human safety or property). Killing problem bears accounted for approximately 6.0% of known mortalities (1990-2007, Figure 2). Problem bear issues (considered a type of human/bear conflict) are usually a result of improperly stored attractants, and therefore, **improper storage of attractants represents one of the primary threats to grizzly bear persistence.** Attractants can be natural or manmade, and are a result of human presence or activities. Bear attractants include, but are not limited to, garbage, human and pet food, game meat, agricultural feed and grains, fruit trees, beehives and livestock. Types of problem bear issues vary throughout the province and tend to be associated with proximity of agriculture, tourism centres, and settlements to grizzly bear range (refer to Table 1 for regional issues). Within national parks, problem bear issues are often a result of improper attractant storage.

Problem bear management actions in Alberta include both short and long distance relocations of problem bears. The number of relocations varies by year and BMA (Figure 7), with the greatest number in southern Alberta. The number of relocations has been steady or slightly increasing (variable between BMAs) since 1990, when the new management plan was implemented (Alberta Fish and Wildlife, unpubl. data). Of the 256 bears relocated between 1974 and 2002, there were 15 subsequent known deaths within a relatively short time after relocation (11 within one year of release and four between one and four years after release; Alberta Fish and Wildlife Division, unpubl. data). However, the number of deaths is likely higher because there is little or no follow up on the fate of relocated bears. Limited research has estimated that approximately 30% of relocated bears die following relocation (Blanchard and Knight 1995). These mortalities may be a result of moving bears to unfamiliar and/or poorer quality habitats, relocated bears

being killed by resident male bears, and/or continued human/bear conflicts. Recent evidence also suggests that capture and handling can have adverse physical effects and can sometimes lead to grizzly bear mortalities (Cattet *et al.* in pres.). Overall, grizzly bear relocations can make a significant contribution to total human-caused mortality rates (within a BMA, removing a bear is equivalent to a death in terms of population size). Furthermore, the effects of relocated bears on resident bear populations in the release area are unknown.

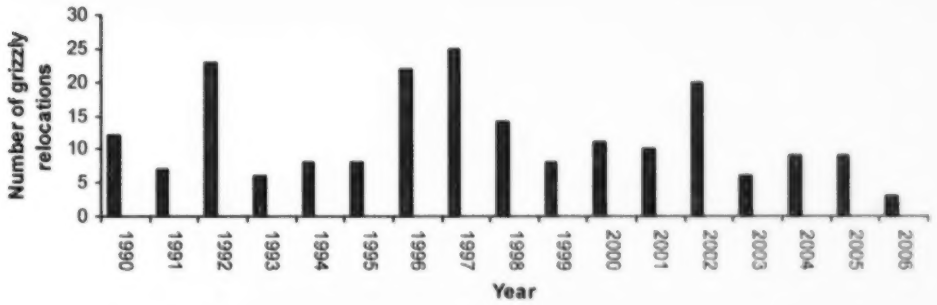



Figure 7. Number of grizzly bears (including cubs) relocated in Alberta by year, 1990 to 2006 (2007 data unavailable).

D. Vehicle and Train Collisions

Vehicle and train collisions accounted for approximately 4% of known and estimated mortalities (1990-2007, Figure 2), although vehicular collisions are a major cause of mortality in national parks. Some collisions may go unreported.

E. Other

Accidental trapping by fur trappers, research related mortalities, and unknown causes accounted for a small percentage of known and estimated mortalities (1990-2007, Figure 2). It is difficult to gather accurate data on accidental trapping and accidental death from illegal poisonings, as these often go unreported. Another source of bear mortality that is difficult to track involves bears that are injured or displaced from their dens as a result of human activities.

## 3.2 Habitat Alteration and its Effects

Habitat alteration and fragmentation result from natural events and human land-use, including resource extraction (e.g., oil/gas, mining, and forestry), agriculture, utility development, recreational activities, and settlement. Grizzly bears may be affected directly through removal or degradation of suitable habitat, or indirectly by avoiding human activities and changes on the landscape. Although grizzly bears are adaptable, the extent to which habitat change can occur before it influences survival and/or reproduction rates is not known. Also, some types of habitat alteration are conducive to grizzly bear needs provided associated human activity is low.

### 3.2.1 Natural Disturbances

A number of natural disturbances affect grizzly bear habitat, including forest fires, insect and disease epidemics, floods, avalanches, and wind and ice damage. Prevention of natural disturbance through aggressive fire suppression, most notably from the late 1940's onward, has resulted in forests that are much different (i.e., older) than would have occurred naturally if fires had been allowed to run their course. Compared to younger, open-canopy habitats, older forests typically do not provide as much food (berries and forbs) for grizzly bears (e.g., Zager *et al.* 1983; Nielsen *et al.* 2004c).

### 3.2.2 Forest Harvest

Fire suppression has resulted in forest harvest replacing fire as the major mechanism of forest removal and renewal on the landscape. Forest harvesting practices can increase food production in an area; for example, 8 to 42 year old harvest blocks provided more grizzly bear forage plants than older forests (Nielsen *et al.* 2004b and c). However, the type of silvicultural techniques used, surrounding habitat, and land use influence the habitat quality of harvested areas for grizzly bears (Zager *et al.* 1983, Nielsen *et al.* 2004b and c).

### 3.2.3 Human Infrastructure

Human infrastructure such as roads, gas plants, pipelines, power lines, farms, residences, and recreational and tourism facilities can potentially influence grizzly bear populations and habitats in a number of ways. Infrastructure removes grizzly bear habitat from an area directly through removal of forage and cover, and indirectly if bears avoid habitats adjacent to infrastructure (McLellan and Mace 1985, Archibald *et al.* 1987, Mattson *et al.* 1987, Kasworm and Manley 1990). Depending on density of roads and volume of traffic, roads may be a deterrent to grizzly bear movement resulting in the exclusion of important resources within a bear's home range (Archibald *et al.* 1987, Mattson *et al.* 1987, McLellan and Shackleton 1988, Kasworm and Manley 1990). Human activity accompanies infrastructure, to varying degrees, and can therefore increase risk of conflict and bear mortality.

### 3.2.4 Loss of Connectivity

Reduced movement can influence the genetic composition within and among grizzly bear populations, and populations may become isolated when they are no longer able to move freely across the landscape as they did prior to development (Paetkau *et al.* 1998, Gibeau 2000, Gibeau *et al.* 2002). In southwest Alberta and southeast B.C., settlement patterns, and possibly high traffic volumes, appear to have resulted in high human-caused mortality and a partially fragmented set of local grizzly bear sub-populations (Gibeau 2000, Proctor 2003). Proctor (2003) suggests that, because several fragmented sub-units are small, maintaining regional connectivity may be necessary to ensure their persistence. Expanding human settlement in grizzly bear range is likely to remove grizzly habitat and/or disrupt movement patterns.

## 3.3 Cumulative Effects

Cumulative effects are the combined influence of limiting factors, including human activities, which may impact the quality and quantity of grizzly bear habitat in an area. This influences the carrying capacity (when mortality rates equal recruitment rates; in other words, the number of

individuals that can be supported in a given area within natural resource limits and without degrading the natural environment). It is important to improve our understanding of cumulative effects and grizzly bear carrying capacity. Analysis of cumulative effects, at the BMA scale, will ultimately provide managers with information that will help determine, and thus allow for better management of, the amount, type and location of habitat alterations and human activities that can occur in an area and still support grizzly bears over the long-term (Gibeau 1998, Stenhouse *et al.* 2003c).

Table 1 outlines regional grizzly bear issues.

Table 1. Regional grizzly bear issues.

| Region[1] | Causes of conflict, mortality[2], and habitat alteration | Population notes |
|---|---|---|
| **Southeast** | • Grizzly expansion eastward is creating conflict with landowners, cattle ranchers, bee yards, and grain farmers.<br>• Primary mortality: illegal kills | Size and status of population unit unknown; possible range expansion. Need to understand habitat use and travel corridors; bears vulnerable on prairie |
| **Southwest**<br><br>6<br>7 south | • Conflicts related to cattle ranching leads to relocations (removal of bears from population) and increased expenses (damage prevention and compensation)<br>• Increasing access development and use (industrial and recreational) increases mortality risk<br>• Increasing activity (recreation and commercial) leads to conflicts<br>• Increasing residential development leads to habitat loss and conflicts, and impedes connectivity<br>• Primary mortality: self-defence (BMA 6); problem wildlife (BMA 7) | DNA census from 1997 (needs to be updated); relatively small population; genetic interchange with BC and Montana bears; high removal mortality (human-caused) |
| **Southern foothills**<br><br>3B,4C south<br>5<br>7 north | • Increasing access development and use (industrial and recreational) increases mortality risk<br>• Increasing activity (recreation and commercial) leads to conflicts<br>• Increasing residential development leads to habitat loss and conflicts, and impedes connectivity<br>• Fire suppression has reduced value and quantity of grizzly habitat<br>• Primary mortality: illegal (BMA 4C); problem wildlife (BMA 7); First Nations (BMA 5) | Small population size; lowest reproductive rate in North America (Bow Valley); high human-caused mortality of female bears in recent years (2000 – 2003); movement corridors essential for regional connectivity. |
| **Northern foothills**<br><br>3A west<br>3B,4B north<br>4A,2B west | • Increasing access development and use (industrial and recreational) increases mortality risk<br>• Increasing grazing leases in grizzly habitat (green and white zone) leads to conflicts and increased expenses (damage prevention and compensation)<br>• Improper securement of attractants, particularly landfills, leads to conflicts and mortality<br>• Primary mortality: illegal (BMA 2B,4B); self-defence (BMA 2B,4A) | Research in the Foothills Model Forest area (1999-2003) indicates good reproductive rate; and high mortality (human-caused). |

[1] regions approximate, corresponding current BMAs listed

[2] primary unregulated mortality based on mean of five or more known grizzly mortalities in a BMA, 1990-2003 (Fish and Wildlife Division, unpubl. data)

| Region[1] | Causes of conflict, mortality[2], and habitat alteration | Population notes |
|---|---|---|
| **Northwest**<br><br>1<br>2A<br>2B east<br>3A east | • Increasing access development and use (industrial and recreational) increases mortality risk<br>• Increasing grazing leases in grizzly habitat (green and white zone) and policy of selling white zone crown land in grizzly habitat lead to habitat loss, conflict, and increased expenses (damage prevention and compensation)<br>• Vulnerability to poaching in green-white zone interface<br>• Primary mortality: illegal (2A,2B); self defence (BMA 2B) | Limited data; population may be stable in some parts of region but need validation |
| **Northeast** | Currently lacking grizzly bears | May be considered for range expansion |

## 4.0 RECOVERY PLAN PRINCIPLES, FEASIBILITY, CHALLENGES, AND OPPORTUNITIES

### 4.1 Guiding Principles for Recovery

a) **Commitment to grizzly bear recovery**
   All people who value and use grizzly bear range in Alberta, including government, industry and recreational users, commit to share responsibility and work together to ensure a viable and self-sustaining grizzly bear population. In addition, no one element of society should pay disproportionately to recover grizzly bears.

b) **Decisions based on science**
   Recovery efforts will be most successful when based on the best available scientific information, and efforts to provide increased scientific information must continue.

c) **Precautionary principle**
   Erring on the side of caution will help to ensure grizzly bear populations do not become irrevocably small. Recovery actions must not be delayed while data are being acquired and information verified, and expert opinion should be used when data are lacking.

d) **Ecosystem management**
   Grizzly bears and their habitat are a component of a complex ecosystem, and should not be managed in isolation. Cumulative effects should be tracked to address grizzly bear recovery within an ecosystem management framework.

e) **Adaptive management and long-term sustainability**
   Recovery is a dynamic process best achieved by continually adapting and improving management actions, which includes monitoring and evaluating recovery efforts. Because of the goal of long-term sustainability of grizzly bears, this will be an ongoing commitment.

f) **Sustainable development on a multiple use landscape**
   Grizzly bear recovery can be balanced with socially and economically important activities. In other words, bears and humans can coexist on the same landscape if there is a willingness to conduct human activities in ways that are conducive to grizzly bear conservation.

### 4.2 Feasibility of Recovery

The Team believes the recovery of grizzly bear populations in Alberta is achievable and desirable. The following assessment outlines the biological, technical, and social feasibility of grizzly bear recovery.

**Biological considerations**:

- Currently occupied habitats (in terms of quality and quantity) are sufficient to support a viable population of grizzly bears in Alberta.
- Apart from unpredictable large-scale natural disturbances, human footprint and activities will be responsible for the only major habitat changes in grizzly range in the foreseeable future.

- In some areas of the province, where data are available, grizzly bear productivity is sufficient to increase the population size if mortality rates can be reduced.
- Most mortality is human-caused and can be reduced through management.
- There may be opportunities for range expansion (reoccupation of historic range) in northeast and southeast Alberta (see Figure 1).

**Technical considerations:**

- Identification of specific recovery actions at a regional level will account for different management issues and grizzly bear mortality rates.
- New knowledge and tools (habitat mapping, movement corridor analysis, mortality risk assessment, etc.) are promising aids for conservation, and new tools can be expected in the future.
- Monitoring and evaluation of recovery actions will allow for adjustments and ensure success i.e., adaptive management

**Social considerations:**

- Within grizzly bear habitat, humans and grizzly bears can coexist if humans are willing to control their activities to reduce conflicts with bears. For grizzly bears that migrate into more developed landscapes such as agricultural lands and urban areas, a strict bear management program that ensures human safety must be maintained.
- Other jurisdictions (Montana and BC) have demonstrated that some success can be achieved with education, access control and management actions.

## 4.3 Knowledge Gaps

The following knowledge gaps need to be addressed to improve grizzly bear recovery:

- Grizzly bear population estimates and trends for each BMA (and the province)
- Delineation of population units north of Highway 16 (to develop BMA boundaries and apply management actions accordingly), using the best available science-based approach.
- Grizzly bear population carrying capacity for each BMA
- Need to develop and evaluate mortality risk models for each BMA (i.e., risk of access and infrastructure development and use to grizzly bears)
- Efficacy of grizzly bear management techniques (although some techniques are already in use and have been evaluated over the short term, e.g., Bergman 2003, continued monitoring is recommended), as determined by number of conflicts, relocations, and bear mortalities
- Efficacy of human management techniques, particularly proposed access control techniques and attractant management, as determined by whether people are changing their behaviours, and whether this is reflected in the number of conflicts
- Long-term response (reproductive performance and health – see glossary) of grizzlies to changing landscapes.

### 4.4 Potential Conflicts, Challenges, and Opportunities

A primary challenge is maintaining high quality grizzly habitat and minimizing risk of human-caused grizzly bear mortality in a landscape where there is increasing human pressure that can directly or indirectly remove habitat or increase mortality risk to bears. It is difficult to reconcile grizzly bear needs for large home ranges and diverse habitat with society's priorities. In addition, grizzly bear recovery needs and management issues vary across the province, requiring different solutions. Actions implemented in isolation or without recognition of specific regional issues will have reduced success.

Many other wildlife species use grizzly bear habitat in Alberta. However, it is not possible to evaluate the needs of all species within the context of this Plan. A recovery plan for woodland caribou (*Rangifer tarandus)*, a *Threatened* species, was approved in 2005. Ensuring that specific management actions for species in shared habitats do not come into conflict will be an ongoing responsibility of Alberta Fish and Wildlife Division as the two plans are implemented.

Encouraging Albertans to accept and value bears and their habitat is critical to the long-term survival of grizzly bears, particularly in locations where bears are perceived as a safety concern or have the potential to damage property. Societal views towards predators and grizzly bears in particular, have changed dramatically in past decades. There is an opportunity to foster and support this public good will and adopt enlightened policies to coexist with grizzly bears in Alberta.

Finally, socio-economic priorities within government (and other agencies involved in implementation) are a challenge to timely implementation of high priority recovery actions. The Team recognizes that grizzly bear recovery is only one of multiple initiatives administered by government, and recommends incorporating grizzly bear recovery actions with other processes as much as possible to maximize net gains. Recovery success is largely contingent upon government support and action, however, the support and commitment from other agencies and organizations is key to achieving the goal of grizzly bear recovery in Alberta. New annual funding, staff, and associated resources are needed to meet recovery actions and timelines outlined in the Recovery Plan.

## 5.0 RECOVERY GOAL AND OBJECTIVES

### 5.1 Goal

To restore, and ensure the long-term viability of, a self-sustaining grizzly bear population in Alberta.

### 5.2 Objectives

Objectives address threats to grizzly bear populations, and provide ways to measure recovery success. Objectives 1 and 2 are considered equally critical and **strategies and actions related to**

**these two objectives should be implemented immediately and concurrently**. It is imperative to understand the population size and at the same time take actions to reduce mortality.

***Objective 1:*** *Limit the rate of human-caused mortality per BMA to within scientifically established values.*

In Alberta, human-caused mortality appears to be too high to sustain grizzly bear populations in the long-term. As outlined in "Threats", types of human-caused mortality are varied and often inter-related. By aiming to reduce the rate of human-caused mortality, Objective 1 provides a measure to track recovery success and to make adjustments to recovery actions accordingly. The measures of success focus on the root causes of the predominant types of unregulated mortality. In simple terms, regulating human use of access (specifically motorized vehicle routes) in grizzly bear range reduces the risk of human-caused mortality.

Measures of Success:

A. Total number of known human-caused mortalities per BMA per year should account for ≤4% of the provincial population per year, within this total there can be a 4% male mortality rate and a 1.2% female mortality rate (variance among BMAs is expected, but should be near provincial targets). Four percent is a conservative rate during the population recovery phase, which has been used successfully in the Yellowstone ecosystem (US Fish and Wildlife Service 2003), and may be increased once populations have recovered. However, McLoughlin (2003) estimated that known human-caused mortality rates exceeding 4.9% could be deleterious to populations (see "Threats"). Evaluations of mortality rate should be made on a 6-year running average, which approximates two grizzly bear reproductive cycles, an appropriate time period to determine trends.

B. Grizzly bear population trend should increase over time towards carrying capacity. However, evaluating this measure is currently limited by lack of a reliable population estimate and carrying capacity (see Objective 2), and requires repeated population surveys over time. In addition, due to the slow reproductive rate of grizzly bears, it will take considerable time for the population to increase. Although an increasing population trend is an important measure of success, it will take a minimum of five years to produce a preliminary estimate of trend according to the proposed DNA inventory.

C. Open route densities (refer to Access Types text box on following page) at or below 0.6 km/km$^2$ in high quality grizzly bear habitat designated as Grizzly Bear Priority Areas (GPAs; refer to "Strategies" for details), and open route densities at or below 1.2 km/km$^2$ in all remaining grizzly bear range (these density values have been adopted by some jurisdictions in the USA for the purpose of grizzly bear conservation e.g., US Fish and Wildlife Service 2003). Smaller footprints may be recommended in certain areas; the plan does not endorse managing access to meet these open route density thresholds. Open routes are roads and trails (including seismic lines) on which motorized travel is possible and permissible (tracking this also contributes to our understanding of the overall human footprint). Because human use of access is difficult to measure, open route densities are

recommended as a surrogate for amount of human use (local level assessments will be used to determine which routes are used and how much they are used). Lower open route densities should reduce rates of human-bear interactions and ultimately reduce rates of human-caused mortality. For the east slopes region of Alberta, Nielsen et al. (2004a) has presented models and maps of grizzly bear mortality risk. These spatial models combine risk factors to produce a numerical score of risk of human-caused mortality (and will be able to account for regional differences). These models are currently being updated and integrated for other areas of Alberta. The Team recommends replacing open route density with mortality risk values as a measure of success, once sufficient data have been collected and model development and validation are complete.

**Access Types**

**Road** – access that is reasonably and prudently drivable with on-highway vehicles.

**Trail** – access that is not reasonably and prudently drivable with on-highway vehicles

**Motorized Trail** – trail that receives motorized use, such as ATVs, trail bikes, and 4WD vehicles

**Route** – Roads and trails that receive motorized use (including seismic lines)

**Open route** – A route without restrictions on motorized vehicle use

**Restricted route** – A route on which motorized use is controlled in time, space, or activity for the purposes of grizzly bear conservation and/or protection of other natural resources. Motorized use by personnel of resource management agencies, contractors, and permittees is acceptable at low intensity levels as defined by convention (e.g. USA: 80 vehicles/month insert values (USDA 1990), Canada: 100 vehicles/month (Gibeau 1998), mortality risk models, or other relevant analysis.

**Notes on Open Route Density Process**

In most grizzly bear range in Alberta, current open route density is much higher than the recommended targets in this Plan. An inclusive and thoughtful process, and implementation data and tools, are needed to determine which routes should be open and which should have some form of restriction. (Route densities must be calculated over a large area, such as a watershed, use a 1sq km-moving window in GIS). Considerations include:

- Open route density determination for grizzly bear conservation should be included in comprehensive access management processes that consider all resource values for a given area and include a public consultation process. Until access management (or equivalent) plans are completed, restrictions should be placed on human use of new routes as they are developed, particularly in high quality grizzly bear habitat.
- Information about grizzly bear habitat quality, location of existing and potential routes in relation to habitat quality, and level and type of human use should be used to support the access management process. For example, high human use and activities that involve firearms are a higher risk to bears than many other activities, particularly in high quality habitat where bears spend most of their time. A cooperative approach between the Alberta government and disposition holders is recommended.
- Regulatory methods are the preferred method of applying route restrictions; legal authority must support restrictions. Physical barriers are costly and ineffective if not backed up with legal authority, and can be a safety or environmental hazard. Physical barriers may not be needed if regulatory restrictions are clearly defined, enforced, and monitored, although are recommended in areas where other resources need to be protected or there is sustained, high grizzly bear mortality. Stakeholders and government should work cooperatively to monitor restricted access networks to determine efficacy of regulations. Other jurisdictions have effectively used signs, public reporting, and targeted enforcement to maintain restricted routes. In Alberta, effective road closures have only been successful where legislative mechanisms and suitable enforcement, e.g., forest land-use zones, have been in place.

***Objective 2:*** *Improve knowledge of grizzly bear population size and associated data to understand the nature and level of risk and carry out recovery actions in the most effective manner.*

It is important to determine current (baseline) grizzly bear population size and trends to evaluate recovery need and monitor success over time on a provincial scale. Population estimates per BMA are needed, the sum of which could be used to provide a provincial population estimate. New data from inventory programs and recent research advances in Alberta offer unique opportunities to investigate carrying capacity estimates for each BMA. The relationships between population estimates and landscape conditions must be explored using the most recent and best available scientific approaches. This course of action may provide realistic BMA

recommended as a surrogate for amount of human use (local level assessments will be used to determine which routes are used and how much they are used). Lower open route densities should reduce rates of human-bear interactions and ultimately reduce rates of human-caused mortality. For the east slopes region of Alberta, Nielsen et al. (2004a) has presented models and maps of grizzly bear mortality risk. These spatial models combine risk factors to produce a numerical score of risk of human-caused mortality (and will be able to account for regional differences). These models are currently being updated and integrated for other areas of Alberta. The Team recommends replacing open route density with mortality risk values as a measure of success, once sufficient data have been collected and model development and validation are complete.

**Access Types**

**Road** – access that is reasonably and prudently drivable with on-highway vehicles.

**Trail** – access that is not reasonably and prudently drivable with on-highway vehicles

**Motorized Trail** – trail that receives motorized use, such as ATVs, trail bikes, and 4WD vehicles

**Route** – Roads and trails that receive motorized use (including seismic lines)

**Open route** – A route without restrictions on motorized vehicle use

**Restricted route** – A route on which motorized use is controlled in time, space, or activity for the purposes of grizzly bear conservation and/or protection of other natural resources. Motorized use by personnel of resource management agencies, contractors, and permittees is acceptable at low intensity levels as defined by convention (e.g. USA: 80 vehicles/month insert values (USDA 1990), Canada: 100 vehicles/month (Gibeau 1998), mortality risk models, or other relevant analysis.

**Notes on Open Route Density Process**

**In most grizzly bear range in Alberta, current open route density is much higher than the recommended targets in this Plan. An inclusive and thoughtful process, and implementation data and tools, are needed to determine which routes should be open and which should have some form of restriction. (Route densities must be calculated over a large area, such as a watershed, use a 1sq km-moving window in GIS). Considerations include:**

- **Open route density determination for grizzly bear conservation should be included in comprehensive access management processes that consider all resource values for a given area and include a public consultation process. Until access management (or equivalent) plans are completed, restrictions should be placed on human use of new routes as they are developed, particularly in high quality grizzly bear habitat.**
- **Information about grizzly bear habitat quality, location of existing and potential routes in relation to habitat quality, and level and type of human use should be used to support the access management process. For example, high human use and activities that involve firearms are a higher risk to bears than many other activities, particularly in high quality habitat where bears spend most of their time. A cooperative approach between the Alberta government and disposition holders is recommended.**
- **Regulatory methods are the preferred method of applying route restrictions; legal authority must support restrictions. Physical barriers are costly and ineffective if not backed up with legal authority, and can be a safety or environmental hazard. Physical barriers may not be needed if regulatory restrictions are clearly defined, enforced, and monitored, although are recommended in areas where other resources need to be protected or there is sustained, high grizzly bear mortality. Stakeholders and government should work cooperatively to monitor restricted access networks to determine efficacy of regulations. Other jurisdictions have effectively used signs, public reporting, and targeted enforcement to maintain restricted routes. In Alberta, effective road closures have only been successful where legislative mechanisms and suitable enforcement, e.g., forest land-use zones, have been in place.**

***Objective 2:*** *Improve knowledge of grizzly bear population size and associated data to understand the nature and level of risk and carry out recovery actions in the most effective manner.*

It is important to determine current (baseline) grizzly bear population size and trends to evaluate recovery need and monitor success over time on a provincial scale. Population estimates per BMA are needed, the sum of which could be used to provide a provincial population estimate. New data from inventory programs and recent research advances in Alberta offer unique opportunities to investigate carrying capacity estimates for each BMA. The relationships between population estimates and landscape conditions must be explored using the most recent and best available scientific approaches. This course of action may provide realistic BMA

population targets (social and economic factors will also be considered) and a provincial population goal.

Recovery plans generally identify population targets, but setting a population target for grizzly bears in light of insufficient data would be misleading. Identifying a realistic population target, based on current and reliable data, is the first step towards achieving a population goal.

Populations need to be tracked on a BMA basis to address regional grizzly bear issues and implement recovery actions accordingly. Additional types of data are critical to understanding potential impacts on grizzly bear populations, and need to be stored and tracked through comprehensive database management.

Measures of Success:

A. Population size estimate with confidence intervals for each BMA. Complete BMAs south of Hwy 16 by December 2006, and remaining BMAs by December 2008.

B. Provincial population target (based on BMA population targets).

C. Current database updated annually, with consolidated data from all sources throughout the province, including but not limited to, data on relocations, mortalities, health, and DNA samples (data will be available through reporting).

D. Monitor population trend through repeated inventories (alternate methods may be developed in the future).

***Objective 3:*** *Reduce the rate of human/grizzly bear conflicts.*

Reducing human/grizzly bear conflicts will help to reduce human-caused grizzly bear mortality. This objective differs from Objective 1 by focusing on problem bear issues and management activities. Number of human/bear conflicts is not indicative of the population size; rather, it is indicative of the potential for mortality risk to bears and reflects ongoing societal issues (i.e., risk to people and/or property). While the aim is to reduce the number of conflicts, it is important to recognize that a reduction in conflicts could be a result of a decreasing bear population and not necessarily improved management. Similarly, an increase in conflicts could be a result of an increasing bear population and not ineffective management (however, successful management should allow for an increase in population without an increase in conflicts). Clearly, measures of success need to be evaluated in the context of other recovery criteria. An evaluation of management responses (i.e., agency control) is also important, because long-distance relocations and euthanasia contribute to grizzly bear mortality and survival rates. Successful management activities will not only minimize conflicts, but will also minimize the need for relocations and killing of problem bears.

Measures of success:

A. 10% decline in number of conflicts (i.e., threats or damage to people and property) per BMA per year over five years. Conflict rates should be reviewed on a 3-year rolling average, allowing a reasonable length of time to determine trends. (10% selected as an achievable, annual reduction rate.)

B. 10% decline in number of long-distance relocations per BMA per year for five years. This rate should also be reviewed on a 3-year rolling average.

C. Zero female grizzly bears killed as problem wildlife (through agency control) per year, while at the same time reducing the total numbers of bears killed each year to less than five animals.

***Objective 4:*** *Identify, track and maintain habitat for grizzly bears.*

Habitat requirements are primarily for sufficient forage (which changes seasonally) and security cover, the latter of which is addressed by reducing and controlling access and human activity in grizzly bear range (Objective 1). Provided human use of grizzly bear range can be controlled, few activities threaten to remove or permanently alter significant amounts of grizzly bear habitat (mines are an example of large scale habitat change). However, the cumulative impact of multiple activities could sufficiently alter habitat or create disturbances that cause bears to avoid certain areas. Habitat alteration such as clear cutting (without herbicide control) can improve, at least temporarily, availability of grizzly forage plants (Nielsen et al. 2004c). However, habitat alteration is often accompanied by human activity, which increases the potential for conflict and mortality for bears. Consequently, a balanced approach is necessary to understand and implement recovery actions, and it is important to track quality and quantity of grizzly habitat to ensure that suitable habitat remains available to bears spatially and temporally, and is integrated with land use decisions. It may also be beneficial in some areas to enhance habitat for grizzly bears. A recommended interim measure to track habitat within each BMA is to determine risk of mortality (Neilsen et al. 2004a) and calculate habitat change (as determined by current RSF scores) as surrogate measures of habitat conditions for grizzly bears.

Measures of Success:

A. Maintain, as a minimum, current provincial distribution and occupancy levels i.e., >= 228,000 $km^2$ of contiguous grizzly bear range. Occupancy is defined as presence of female bears with young (as determined by DNA analysis or telemetry studies).

B. Maintain quality and quantity of foraging habitat, linked by effective movement corridors. Completing habitat maps (refer to Appendix 5 for mapping schedule and costs) to determine current foraging habitat status and targets and evaluate changes to habitat over time will provide this measure. This includes tracking landscape change associated with human activities (i.e., human footprint). RSF and/or other suitable criteria will also be employed.

## 6.0 RECOVERY STRATEGIES

The Recovery Plan will be achieved through the following primary strategies, some of which overlap due to common objectives. Detailed recommendations are provided in the Recovery Action section.

### 6.1 Reduce Human-caused Mortality of Grizzly Bears

This strategy addresses limiting human-caused grizzly bear mortality (Objective 1) and supports reducing human/grizzly bear conflict (Objective 3). This strategy is twofold; consisting of an interim measure to immediately eliminate hunting mortality (6.1.1), and a comprehensive, long-term approach to reduce unregulated mortality (6.1.2). **Both components are equally important and need to be implemented concurrently.**

#### 6.1.1 Temporarily suspend licensed hunting of grizzly bears

It is recognised that, for healthy wildlife populations, hunting can be a useful management tool and can provide recreational and economic activity. However, because hunting is the largest source of grizzly bear mortality, an immediate, temporary suspension of the hunt is necessary to significantly reduce mortality while recovery actions are implemented. In addition, the temporary suspension will allow time to gather and improve inventory data, which will be used to guide future hunting allocations. This suspension is designed to be temporary and dependant on achieving population (BMA) level conditions that support a sustainable harvest; a similar strategy was successfully applied to mountain goats in Alberta, for which there is now a limited entry hunt. When recovery has been achieved, hunting resumption can be considered on a BMA basis (refer to Appendix 1 for details). A hunting suspension on its own will likely not recover grizzly bear populations, but should be implemented immediately. The proceeding strategies are critical for the long-term survival of grizzly bears and are the focus of the Recovery Plan.

#### 6.1.2 Manage access and other land uses in grizzly bear range

Setting guidelines to determine acceptable levels of access use and other activities is critical to reducing human-cause mortality, and needs to be addressed at a regional level to accommodate different issues and circumstances. Development of Regional Grizzly Bear Recovery Implementation Teams (multi-stakeholder groups, representing BMAs; hereafter referred to as Regional Teams) will facilitate application of recovery recommendations at the regional level. Regional Teams will identify issues and action priorities, following recommendations in the Plan, and produce a regional implementation plan. They should be designed as adaptive management plans, containing a series of milestones that trigger either additional conservation measures or relaxation of restrictions, depending on results, and should be more conservative where grizzly bear mortality levels are high or population levels are low. Refer to Appendix 2 for Terms of Reference for Regional Teams.

One of the key concepts of this strategy is creation of Grizzly Bear Priority Areas (GPAs) in high quality habitat in each BMA, to maintain habitat quality and ensure low risk of mortality (refer to Appendix 3 for an example of GPA delineation.) Although recovery actions will be applied to all grizzly bear habitat, there is scientific and practical merit to distinguishing areas of priority habitat (i.e., GPAs) to be managed in a more stringent way. GPAs will also provide conditions

conducive to high reproductive output and improved survival, and as such may act as a source of bears for other areas. This will be accomplished primarily by controlling the number, location, and use of access routes. Additional activities, including agriculture, facility development and operation (industrial and recreational), recreational activities, and OHV use also need to be addressed through appropriate management within and grizzly bear dispersal zones. Refer to Table 2 for detailed guidelines.

Regional Teams will use current tools, and those under development, to provide a scientific basis to advise on size, number and placement of GPAs. Large contiguous areas are encouraged and movement corridors between GPAs will likely be required to allow for connectivity. As a minimum there should one GPA, not be less than 4 female home ranges in size (or 2,400 km2 as per the example in Appendix 2) in every BMA. Regional Teams will advise on size, number, and placement of GPAs but these physical parameters will be determined in relation to the size of the BMA, the quality and quantity of habitat, and to mortality risk factors as identified in the region. Regional teams should determine appropriate combinations of actions for grizzly bear habitat inside grizzly bear dispersal zones, as per Table 3. Flexibility will be needed; more stringent management will be necessary where large road footprints and high human activity occur.

Regional FWD biologists will help to guide GPA delineation and continue to have the primary responsibility for grizzly bear management. However, as the land manager responsible for managing access and approving industrial activities, Alberta Sustainable Resource Development will play a key role in administering the various processes associated with managing access, both recreational and industrial.

## 6.2 Improve Knowledge of Grizzly Bears

This strategy addresses Objective 2 ('knowledge') and is critical for recovery direction and evaluation.

### 6.2.1 Conduct inventory of grizzly bear populations

Develop and implement a long-term, rotating schedule of grizzly bear inventory in each BMA, including habitat mapping. BMAs should be delineated according to subpopulations identified through DNA analysis (refer to Appendix 4 for current and proposed BMA boundaries) to correspond with inventory and mortality data. Refer to Appendix 4 for recommended priorities and timelines for inventory and habitat mapping.

The only way to provide improved input data and verify a new population estimate is to conduct well-planned population census work in all BMAs. New research using resource selection function (RSF) modeling linked with habitat based food models, offers promise to estimate population size based on habitat-specific densities, and may be useful in determining and predicting landscape carrying capacity for grizzly bears.

Combining this approach with DNA census results may offer grizzly bear managers new tools and approaches to better understand the relationship between landscape conditions and grizzly bear population size. As the science related to these approaches proceeds, new results can be

used to evaluate and possibly recalibrate population estimates. New database estimates can also serve to set new benchmarks for population trend monitoring over time. Eventually, less expensive and labour-intensive methods of estimating population size should be explored. Determining the provincial grizzly bear population size and trend is critical for conservation and management.

6.2.2 Monitor grizzly bear mortality, health and recruitment data

Collect and review mortality data, problem bear records and summaries, new grizzly bear health data, and available recruitment data in a comprehensive database to evaluate recovery and ongoing sustainability of provincial grizzly bear populations. These data will be used to track and analyse the efficacy of management activities and the influence of human activities on grizzly bears. In addition, a standardized provincial bear handling protocol (under development) will ensure suitable data are collected consistently, while minimizing risk to bears.

## 6.3 Reduce Human/Bear Conflicts

This strategy addresses Objective 3 ('conflicts'), and supports Objective 1 ('mortality'). Conflict management necessitates a twofold approach, to address behaviours of both people and grizzly bears. Many actions under this strategy will be applied on a provincial basis, and others will be implemented by Regional Teams to effectively address local issues (i.e., grizzly bear behaviour management).

6.3.1 Work with people to reduce conflicts with grizzly bears

Actions under this strategy are directed at people who live and/or are active in grizzly bear range to reduce the potential for conflict. These activities will be supported through an education program (see 6.4).

6.3.2 Manage grizzly bear behaviour

Several jurisdictions have had success recently with aversive conditioning as a means of managing bear behaviour. Techniques ranging from noisemakers, rubber bullets, electric fence systems, and the use of dogs are being used to condition bears and in some cases even alter unwanted bear behaviour. Management activities directed at influencing bear behaviour are necessary, particularly in areas with high conflict rates. Actions under this strategy will direct Regional Teams to identify local issues and to develop and initiate management programs accordingly. Refer to Table 2 for regional breakdown of issues and primary sources of mortality (see also Appendix 6 for maps of conflict and mortality rates).

## 6.4 Improve and Deliver Education and Outreach Programs to Enhance Grizzly Bear Conservation

This strategy addresses elements of all objectives, and supports Strategies 6.1 and 6.3.

6.4.1 Develop an education program directed at the general population

Activities will lead to the development and implementation of a province-wide education program directed at the general public. This program is designed to inform Albertans about grizzly bear biology and their value to ecosystems and the economy in Alberta, and to highlight the status of, and risks to, grizzly bears in Alberta.

6.4.2 Review currently available educational programs and implement appropriate programs directed at people who live and/or are active in grizzly bear range

Activities will lead to the development and implementation of a series of education programs for different user groups, including hunters, recreational users, First Nations, land owners, and people working in grizzly range. Emphasis will be based on limiting factors. For example, because most unregulated kills occur during the hunting season, hunter education (for both bear and ungulate hunters) is a priority, regarding bear species identification and behaviour, bear risk analysis, carcass handling, attractant control, and camp placement. Regional Teams will provide advice on education program planning in order to address local issues, which will be integrated with conflict management.

## 6.5 Identify, Track, and Maintain Habitat for Grizzly Bears

This strategy addresses Objective 4 ('habitat') by tracking, and improving if necessary, grizzly bear habitat. Other strategies in this Plan that attempt to limit negative impacts of human footprint will ensure maintenance of secure grizzly habitat. The greatest risk of habitat loss is the cumulative effects of human activity; hence the need to monitor the footprint and initiate habitat conservation and enhancement as required. The responsibility of developing programs designed to ensure habitat conservation and enhancement (emphasis on high value habitat) will rest with Regional Teams and should be integrated with other related land and forest management planning processes where possible. It is possible that habitat enhancement, away from high human use areas, could help reduce conflicts.

## 6.6 Improve Inter-jurisdictional Cooperation

This strategy supports all objectives by sharing knowledge about grizzly bears and ensuring consistency in management across jurisdictional boundaries; successful recovery of grizzly bear populations in Alberta requires significant inter-jurisdictional cooperation and coordination. Grizzly bear populations cross many jurisdictional boundaries (Alberta – British Columbia and Northwest Territories, Alberta – Montana, provincial – federal lands, etc.). Managers from a host of government agencies must work together in a coordinated manner to implement this recovery plan. In addition to improving and expanding existing lines of communication on grizzly bear management, it is necessary to create an interagency database to improve sharing and management of grizzly bear data and participate in relevant interagency committees.

### 6.7 Improve and Apply Regulations and/or Legislation for Recovery Implementation

This strategy supports all objectives by providing regulation and/or legislation necessary to support recovery actions (including all levels of government – federal, provincial, and municipal). This is an over-arching strategy that needs to be addressed concomitantly with other actions (e.g., attractant storage, access use).

## 7.0 RECOVERY ACTIONS

Administration and data management, annual meetings of the Team, and an annual report are on-going activities that will support implementation of recovery actions listed below. Actions considered necessary for recovery within the next five years are itemized below, and those considered as the highest priorities are bolded.

Refer to Table 3 for implementation timelines, participating agencies, and cost estimates, and Table 4 for additional human resources needed for recovery implementation. A Provincial Grizzly Bear Recovery Biologist is one of the new key positions required to oversee Plan implementation.

### 7.1 Reduce Human-caused Mortality of Grizzly Bears

#### 7.1.1 Temporary suspension of grizzly bear hunting

**Immediately suspend grizzly bear spring hunt while recovery is achieved. Refer to Appendix 1 for guidelines as to when a hunt would be advisable.**

#### 7.1.2 Manage access and other land uses in grizzly bear range

a) **Create multi-stakeholder Regional Grizzly Bear Recovery Implementation Teams (Regional Teams; refer to Appendix 2).**
b) **Delineate areas of high quality grizzly bear habitat (essential for food, security and/or connectivity) as Grizzly Bear Priority Areas (GPAs) by using current distribution and habitat maps, and best available science. There should be at least one GPA per BMA, with preference for large GPAs (refer to Appendix 3 for example).**
c) **Follow Access and Land Use Guidelines (Table 2) to recommend appropriate activities (e.g., access development, location and use) within GPAs; implement within one year of Recovery Plan approval.**
d) **Follow Access and Land Use Guidelines (Table 2) to recommend appropriate activities grizzly bear dispersal zones; implement within two years.**

### 7.2 Improve Knowledge of Grizzly Bears

a) **Determine population size (inventory) and targets (appendix 1) per BMA (draft BMAs provided in Appendix 4, based on DNA analysis), using best available method, including habitat mapping (Appendix 5).**
b) **Monitor populations per BMA, primarily through repeated population censuses (five year intervals are recommended initially), to determine trend estimates.**
c) Collect and review mortality, health and recruitment data.
d) Track and analyse influence of human activities and footprint (changing landscape conditions including temporal, spatial and amount of use) in relation to grizzly bear habitat and populations.

e) Create Inter-agency advisory group[1] to determine and advise on research and funding priorities.
f) Conduct research to address knowledge gaps, e.g., reproductive and health data.
g) Improve and consolidate provincial grizzly bear database.

## 7.3 Reduce Human/bear Conflicts

### 7.3.1 Working with people

a. Strategies to control bear attractants:
   - Create regulation, and improve enforcement and communication, about attractants on public lands in grizzly habitat e.g., food and waste handling and storage, similar to food storage order in Yellowstone Plan (refer to Appendix 7). For example, these actions would include keeping a clean camp, using electric fencing or bear proof containers.
   - Ensure municipalities and other landfill managers follow regulations regarding landfills.
   - Ensure that campground operators adhere to proper food and waste storage (stipulation in contract; refer to Table 2)
   - Develop education program (and regulatory procedures, if possible) regarding attractants on private land, including agricultural land and municipalities (review BearSmart Community program at *http://www.bearsmart.com*); support through partnerships with other organizations

b. Create "conflict prevention" positions and/or regional problem wildlife positions with adequate resources to work with landowners, lessees, First Nations, and other individuals living and working in grizzly bear range. One position per area of high conflict, including Crowsnest, Bow Valley, and Grande Prairie.

c. Improve the working relationship with ranchers (critical in southern Alberta), by improving the livestock loss compensation program to ensure fair reimbursement and no net loss by factoring in value lost (i.e., value at sale time), time, production costs and additional losses. Modify compensation policy to acknowledge that, in the absence of verified predation, the presence of grizzly bear at dead livestock justifies compensation.

d. Continue the Southwestern Alberta Grizzly Strategy whereby measures such as high elevation spring intercept feeding and removal of attractants are used to reduce spring livestock depredation by grizzlies; aversive conditioning including officer's use of Karelian

---

[1] **Inter-agency advisory group**- Creation of a team of scientific experts, including resource managers, is necessary to determine data gaps and research needs, assist in review of data relative to recovery, help set provincial priorities, coordinate ongoing research initiatives, and formulate and review research proposals (not conduct research). This group should have scientific membership from a number of agencies including SRD, Parks Canada, Alberta Community Development, and the academic community. Broader input and support should also be gathered from stakeholders to ensure that there is widespread acceptance and understanding of research direction and outcomes that pertain directly to recovery plan actions.

bear dogs is used in grizzly response work, and local versus long-distance translocations of problem bears is emphasized.

e. Improve required hunter training and implement testing to address misidentification with black bears, carcass handling, attractant management, and bear awareness for all hunters (review Montana bear identification test *http://fwp.mt.gov/bearid/default.htm*). This will be incorporated under 7.4b. Ongoing evaluation of the education and training programs are necessary to determine what other management actions may be necessary to reduce self-defence kills and bear human conflicts.

f. Increase resources and field presence of Fish and Wildlife Officers to 1) improve enforcement of all relevant regulations, and 2) improve education e.g., conflict prevention.

g. New dispositions to graze livestock in forested habitat and in areas of forest/agricultural land interface (Alberta's green/white zone interface) should evaluate potential conflicts with grizzly bears before approval (refer to Table 2); approval granted upon low risk and/or development of mitigative measures.

h. Work with existing agricultural disposition holders and landowners to mitigate conflicts, e.g., timing of grazing, type of stock (avoid vulnerable stock, such as sheep, in high conflict areas), secure feed storage.

i. Create regulation, and improve communication and enforcement, about feeding dangerous wildlife

7.3.2 Manage Grizzly Bear Behaviour

Regional Teams will be primarily responsible for identifying management activities.

a. Test, and improve if necessary, efficacy of decision matrix for problem bear management; explore and encourage alternatives to relocation. Implement program to radio track all long-distance relocated bears.

b. Standardize complaint/conflict categories, including root cause analysis of conflicts.

c. Assess utility of intercept feeding; develop standards and implement accordingly (refer to Bergman 2003).

d. Assess utility of aversive conditioning; develop standards and implement accordingly (refer to ongoing activities, such as in the Bow Valley).

e. Assess utility of natural attractant control (i.e., manage grizzly bear plant forage species in residential and conflict areas); develop standards and implement accordingly.

Pending success of recovery actions, the need and utility of population supplementation could be a future consideration.

### 7.4 Improve and Deliver Education and Outreach Program

**Develop a provincial wide education and outreach program to inform and engage the public in grizzly bear recovery.** The foundation of the program will be a communications plan (determine target audiences, priorities, and nature of communication i.e., presentations, signs, written material, etc.) A communication/education specialist needs to be involved in developing and implementing the communications plan, with advice from the Recovery Team. Regional Teams can advise on local level issues and needs. The program will be directed at two levels of audience: 1. The public (message should include ecological value of bears, need for recovery actions, threats to bears, and bear biology/behaviour), and 2. People who live, work, and/or are active in grizzly bear range; including hunters, recreational users, people working, First Nations, landowners, and local governments and planning agencies (integrate with conflict prevention strategy to work with municipalities to control attractants). The education message will be tailored to target groups to address relevant issues.

### 7.5 Identify, Track, and Maintain Habitat for Grizzly Bears

a. **Continue model development of maps to quantify bear habitat by quality rankings and to document their change over time (e.g., cumulative effects of landscape changes, including urbanization, recreational and industrial footprints); this work is directly related to population inventory (refer to appendix)**

b. Continue model development of maps to identify known and potential movement corridors (for land use managers and stakeholders)

Several habitat related actions could be considered in the future. These include investigating and developing habitat enhancement protocols, enhancing or creating corridors, and evaluating potential of using "habitat credits"[2] to protect and enhance bear habitats, especially for high quality habitats.

### 7.6 Improve Inter-jurisdictional Coordination

a. Participate in IGBC (Interagency Grizzly Bear Committee) and other groups.

b. Participate in comprehensive inter-agency database.

---

[2] **Habitat Credits** - This concept places a numerical value on habitat that allows resource developers and landowners to earn "habitat credits" for reclamation, enhancement, or other types of improvements in quantity or quality of wildlife habitat. This could serve to offset the "habitat debits" a development might incur from impacting, reducing, or removing habitat during resource extraction operations, and could serve as a compensatory mechanism for landowners. This concept could be extended to create incentives by generating a marketable "habitat credit" commodity that would function much like carbon credits do for reducing greenhouse gas emissions.

7.7 Improve and Apply Regulations and/or Legislation for Recovery Implementation

The following regulations and/or legislation need to be developed or modified to implement recovery actions listed above:

**a. Mechanism for, and enforcement of, restricted access use.**

**b. Proper storage of attractants, applicable to all users of grizzly bear range, including private and municipal landowners.**

c. Feeding dangerous wildlife.

Table 2. Guidelines for access and land use inside Grizzly Bear Priority Areas and Dispersal Zones.

| Process/Activity | Inside Grizzly Bear Priority Areas | Dispersal Zones in grizzly range |
|---|---|---|
| **Habitat management** | • Incorporate grizzly bear habitat needs into forest and land management, including all dispositions (specifically addressing limiting factors).<br>• Re-vegetation and reclamation should consider grizzly forage plant preferences where appropriate (consider other uses of landscape i.e., avoid grizzly forage in human use areas and conflict with native species). Within Section D, Environmental Concerns, of the Environmental Field Report (EFR), develop a section that addresses grizzly bear issues and conservation for disposition applications within GPAs; ensure direction from Recovery Plan is incorporated. | • Forest and land management is encouraged to incorporate grizzly bear habitat needs<br>• Re-vegetation and reclamation should consider grizzly forage plant preferences where appropriate. |
| **Access Planning** general | • First priority for coordinated road planning e.g., Long Term Access Plans<br>• Preference for: use of existing roads, winter access, temporary roads, and other alternatives to all weather roads<br>• Designated government departments will coordinate road planning required at larger scale before new road construction (for entire GPA if possible, at minimum for larger sub-areas such as watershed).<br>• Coordinated road life cycle planning required, including approximate (or conditional) schedule for construction, use, deactivation, and/or reclamation<br>• Maximum of 0.6 km/km$^2$ open route[1] density. Less is better; smaller footprints may be recommended in certain areas. The plan does not endorse managing access to meet the threshold. Under exceptional circumstances and using a more stringent review, densities may exceed 0.6 km/km$^2$ with strong justification and additional mitigative measures<br>• Consider delayed sale of allocations and/or no surface access for new allocations<br>• Consider resource development deferral of existing allocations under certain circumstances (e.g., highest quality habitat, poor record of access control, more time needed to plan access) | • Second priority for coordinated road planning e.g., Long Term Access Plans<br>• Preference for: use of existing roads, winter access, temporary roads, and other alternatives to all weather roads<br>• Coordinated road planning required (minimum of disposition scale) before new road construction<br>• Road life cycle planning encouraged.<br>• Maximum of 1.2 km/km$^2$ open route density recommended to be integrated into landscape level plans. SRD staff will use these targets in planning and operational approval process. |

[1]**Open route** – a route without restrictions on motorized vehicle use

| Process/Activity | Inside Grizzly Bear Priority Areas | Dispersal Zones in grizzly range |
|---|---|---|
| **Access Planning** - location | • Road corridors avoid high quality habitat, without compromising environmental standards<br>• Mitigation required if road is located in high quality habitat, such as restricted roads, temporary roads, and timing of activity, etc | • Road corridors avoid high quality habitat, without compromising environmental standards<br>• Mitigation encouraged if road is located in high quality habitat, such as low traffic, temporary roads, and timing of activity, etc |
| **Access control**<br><br>*Note: Bill 49 has potential to provide mechanism to enforce access control on LOCs. Need FLUZ etc. for non-LOC access.* | • Identify need, type and extent of access closures on main and secondary roads based on risk assessment (must be effectively closed).<br>• Develop access plan with suitable public consultation to determine closures<br>• Bear friendly policies required for organizations authorized to be in grizzly bear range (refer to "Working Safe in Bear Country")<br>• Deactivation of roads that are not in regular use within 2 months of completion of phase of use<br>• Reclamation of roads that are no longer needed within 1 year of completion of use. Completion is determined within the project life cycle plan (see above)<br>• FLUZ or equivalent authority to allow enforcement of access control plans for the GPA | • Generally no access controls on main roads (with exceptions below)<br>• Potential for seasonal closures of specified roads that penetrate high quality habitat<br>• Access controls on specified secondary roads that penetrate high quality habitat – authorized use only<br>• Bear friendly policies required for authorized use organizations<br>• Deactivation of roads that are not in regular use – action on a priority basis<br>• Reclamation of roads that are no longer needed within 3 years of completion of use |
| **Agriculture** | • Consider deferring new grazing dispositions during recovery phase<br>• New grazing dispositions must demonstrate low risk of conflict with grizzly bears to receive approval. (see Table 3, 7.5 for the development of this process)<br>• Work with landowners and existing disposition holders to mitigate risk of conflict (e.g., timing, type of stock, feed storage) | • New grazing dispositions must demonstrate low risk of conflict with grizzly bears to receive approval<br>• Work with existing landowners and disposition holders to mitigate risk of conflict |
| **Periods of intense human activity** (e.g., logging, drilling, concentrated recreation) | • Season: winter preferred, and special management if winter is not a practical option, such as limit activity during highest season of bear use (e.g., valley bottoms in spring)<br>• Concentrate activity in one area if during bear activity period<br>• Coordination between users must be discussed before implementation<br>• Limited in extent during any one season | • Season: winter preferred. Avoid activity in best habitat during highest season of bear use (e.g., valley bottoms in spring) if possible<br>• Concentrated or dispersed in location<br>• Coordination between users preferred<br>• No limitations in extent |

| Process/Activity | Inside Grizzly Bear Priority Areas | Dispersal Zones in grizzly range |
|---|---|---|
| **OHV access** (Off Highway Vehicle) | • No unmanaged use – OHV use restricted to designated routes and use areas (as determined by Regional Teams and Long Term Access Plans for the area, ILM, FLUZ, etc. (refer to Appendix 8 for U.S. Forest Service OHV plan). OHV plans will be developed in consultation with OHV users and stakeholders. There are sequential steps of restrictions depending on compliance and reduction of risk<br>• Closure or relocation of existing trails/use that impair high quality habitat<br>• Consider seasonal trail closures in high quality bear habitat<br>• Consider restrictions on transporting and using guns on OHVs where other lesser measures have not proven sufficiently effective | • OHV encouraged to use trails and existing use areas – no development of unauthorized cross-country trails<br>• May be closure or relocation of existing trails/use that impairs high quality habitat<br>• May be seasonal or short-term trail closures in high quality bear habitat or where there is current bear activity<br>• May be restrictions on transporting and using guns on OHVs |
| **Facilities** (e.g., gas plants, mine buildings, communities, industrial camps, tree planter camps, commercial tourism facilities, etc.). | • Locate outside GPA if possible, otherwise locate in low quality habitat<br>• Approval of new facilities dependent on planned mitigation; consider deferral during recovery phase<br>• Avoid blocking movement corridors<br>• Mandatory measures to prevent conflict with bears for new and existing facilities and camps (e.g., electric fencing, food storage order, "bearsmart" programs, no-gun policies, etc.) | • Locate in low quality habitat if possible<br>• Approval of new facilities dependent on planned mitigation<br>• Avoid blocking movement corridors<br>• Mandatory measures to prevent bear conflicts |

## 8.0 IMPLEMENTATION SCHEDULE AND COSTS

Table 3 outlines timelines for implementation, lead and participating agencies, and cost estimates for the first three years of recovery. Cost estimates will eventually be updated for the last two years of the Plan. Cost estimates include expenses such as contractor and field crew fees, travel, equipment, and materials, and do not include staff salaries of implementing agencies. It is anticipated that a variety of agencies will participate in the funding and implementation of these activities, and these human resource needs are outlined in Table 4.

Table 3. Recovery action implementation schedule and costs (high priority actions in bold).

For those activities for which a planning stage is required, "Timelines" are presented for planning and not implementation. Refer to Appendix 9 for detailed timelines of high priority actions. Cost estimates are based on December 2005 projections.

| Item | Recovery Action | Initiation Time | Timelines | Lead (Participating) Agencies[1] | Estimated Cost per Year (000's)[2] | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | 2008 -09 | 2009 -10 | 2010 -11 | Total |
| | Recovery team meetings | Ongoing | 1-2/year | FWD | 4 | 2 | 2 | 8 |
| | Annual report | March 09 | Annual review | Team | 0 | 0 | 0 | 0 |
| **7.1** | **Reduce Human-caused Mortality** | | | | | | | |
| 7.1.1 | **Suspend licensed hunt** | April 05 | Annual review | FWD | 0 | 0 | 0 | 0 |
| 7.1.2 | **Manage access & land uses** | | | | | | | |
| a-d | **Create Regional Teams; identify GPAs; recommend guidelines** | April 08 | 1 year (2 years outside GPAs) | FWD (SRD/NP/ Stakeholders) | 35 | 15 | 5 | 55 |
| **7.2** | **Improve Knowledge** | | | | | | | |
| a-b | **Determine population size and targets; monitor** | Ongoing | Annual review (see Appendix 4) | FWD /FMF (researchers/ NP) | 350 | 300 | 455 | 1105 |
| c | Review mortality, health and recruitment data | Ongoing | Annual review | FWD /FMF (researchers/ NP) | 5 | 5 | 5 | 15 |
| d | Track influence of human footprint (landscape change) | Jan 10 | Biannual review | FWD /FMF (researchers/ NP) | 0 | 50 | 50 | 100 |
| e | Create inter-agency advisory group | Jan 08 | 1 year – plan, ongoing | FWD/All partners | 2 | 2 | 2 | 6 |
| f | Research into knowledge gaps | Jan 06 | Continuous as per need | FWD/FMF (researchers/ NP) | 2 | 250 | 250 | 502 |
| g | Improve and consolidate database | Ongoing | 2 years | FWD (NP/ researchers/ FMF) | 0 | 0 | 0 | 0 |
| **7.3** | **Reduce Conflicts** | | | | | | | |
| 7.3.1 | **Working with people** | | | | | | | |
| a | **Attractants control** | April 08 | 1 year – plan, ongoing | FWD/NP (CD/stake-holders) | 15 | 15 | 5 | 35 |

| Item | Recovery Action | Initiation Time | Timelines | Lead (Participating) Agencies[1] | Estimated Cost per Year (000's)[2] | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | 2008 -09 | 2009 -10 | 2010 -11 | Total |
| b | **Create conflict prevention positions** | April 08 | Continuous (emphasis during critical periods) | FWD (CD) | 90 | 90 | 45 | 225 |
| c | **Improve relationship with ranchers (improve compensation)** | April 08 | 1 year – plan, ongoing | FWD/ stakeholders | 10 | 10 | 10 | 30 |
| d | **Hunter training** | April 08 | 1 year – plan, ongoing | FWD/HFT | 50 | 5 | 5 | 60 |
| e | Improve resources and field presence of Fish and Wildlife officers | Sept 08 | Continuous (emphasis during critical periods) | FWD | 100 | 100 | 50 | 250 |
| f | Evaluation of new grazing dispositions | Sept 08 | Continuous | FWD/SRD | 0 | 0 | 0 | 0 |
| g | Work with existing agriculture disposition holders | Sept 08 | Continuous | SRD | 0 | 0 | 0 | 0 |
| h | Communication and enforcement about feeding dangerous wildlife | April 09 | Continuous (emphasis during critical periods) | FWD | 0 | 0 | 0 | 0 |
| 7.3.2 | Manage grizzly behaviour | | | | | | | |
| a-b | Test matrix; standardize conflict categories (root cause analysis) | Jan 09 | 3 year review | FWD | 0 | 0 | 0 | 0 |
| c-e | Intercept feeding; aversive conditioning; natural attractants | Ongoing | 3 year review | FWD (CD/NP) | 25 | 25 | 25 | 75 |
| **7.4** | **Education/Outreach Program** | | | | | | | |
| | **Develop and deliver education program public and target groups** | April 08 | 1 year – plan 2 yrs- implement | FWD/All partners | 30 | 30 | 15 | 75 |
| **7.5** | **Identify, Track & Maintain Habitat** | | | | | | | |
| a | **Continue model development to quantify bear habitat over time** | Ongoing | See appendix 5 – habitat mapping | FWD/FMF (Industry/ ACA) | 50 | 50 | 50 | 150 |
| b | Continue model development for known and potential corridors | Ongoing | 1 year | FWD/FMF/ IndustryACA | 0 | 0 | 0 | 0 |
| c. | Develop a livestock grazing risk model using information on current habitat values, seasonal use information and grizzly bear population data | April 2009 | 1 year and review with mapping schedule | FWD/FMF Apriculture reps and stakeholder associations | 20 | 20 | 20 | 150 |
| **7.6** | **Inter-jurisdictional cooperation** | | | | | | | |
| a | Participate in meetings (IGBC & BC) | Jan 06 | 1 yr to arrange, ongoing | FWD | 4 | 2 | 2 | 8 |
| b | Inter-agency database | Jan 08 | 1-2 years | SRD/FMF (researchers/ NP) | 0 | 0 | 0 | 0 |

| Item | Recovery Action | Initiation Time | Timelines | Lead (Participating) Agencies[1] | Estimated Cost per Year (000's)[2] | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | 2008 -09 | 2009 -10 | 2010 -11 | Total |
| **7.7** | **Improve and apply regulations and legislation** | | | | | | | |
| a | Restricted access use | Ongoing | 1 year | SRD/CD | 0 | 0 | 0 | 0 |
| b | Proper storage of attractants | Ongoing | 1 year | SRD/CD | 0 | 0 | 0 | 0 |
| c | Feeding dangerous wildlife | April 08 | 1 year | SRD/CD | 0 | 0 | 0 | 0 |
| **Total** | | | | | 792 | 971 | 996 | 2,849 |

[1] FWD – Fish and Wildlife Division (SRD); Sustainable Resource Development; CD – Community Development; FMF – Foothills Model Forest; ACA – Alberta Conservation Association; NP – National Parks; HFT – Hunters for Tomorrow. Other agencies may be involved.

[2] Expenses do not include staff salaries of government and other implementing partners. Expenses cover equipment, travel, materials, field crew and contractor fees, and other implementation costs.

Table 4. Estimated human resources needed for recovery implementation (in addition to the Recovery Team)

| Human Resources (government and contractors) | Number of Person Years | | | |
|---|---|---|---|---|
| | 2008-09 | 2009-10 | 2010-11 | Total |
| **Provincial Grizzly Bear Recovery Coordinator** (government or contractor)<br>• Provide guidance for GPA development<br>• Assist with annual reporting<br>• Assist with data management/analysis<br>• Act as liaison for education, training, and other relevant groups and initiatives<br>• Participate in interagency cooperation | 1 | 1 | 1 | 3 |
| **Assistant to Recovery Coordinator** (government or contractor) | 0.5 | 0.5 | 0.5 | 1.5 |
| **Annual Report prepara tion** (government or contractor)<br>• Collate data and prepare report | 0. 25 | 0.25 | 0.25 | 0.75 |
| **GIS support** (contractor)<br>• Assist GPA determination<br>• Spatial data analysis<br>• Mapping | 0.5 | 0.5 | 0.25 | 1.25 |
| **Wildlife Biologists**<br>• Assist with plan implementation | 3 | 3 | 3 | 9 |
| **Forest Officers**<br>• Assist GPA process<br>• Assist with land use decisions relevant to grizzly bear habitat and needs | 3 | 3 | 3 | 9 |
| **Fish and Wildlife Officers** (seasonal staff)<br>• Seasonal positions in NW and SW | 3 (6 @ 0.5) | 3 (6 @ 0.5) | 3 (6 @ 0.5) | 9 |

| Human Resources (government and contractors) | Number of Person Years | | | |
|---|---|---|---|---|
| | 2008-09 | 2009-10 | 2010-11 | Total |
| **Conflict prevention positions** (contractor or government position)<br>• Seasonal positions | 1.5 (3 @ 0.5) | 1.5 (3 @ 0.5) | 1.5 (3 @ 0.5) | 4.5 |
| **Provincial education program** (contractor)<br>• Communications/education specialist to develop and coordinate program | 1 | 1 | 1 | 3 |
| **Hunter training program** (government)<br>• Develop and implement training and testing | 0.5 | 0.5 | 0.25 | 2.75 |
| Total | 11.25 | 9 | 5 | 25.25 |

*Note: Positions identified in this table will support other FWD and SRD activities.*

## 9.0 RECOVERY PLAN MONITORING AND EVALUATION

The Team will meet annually to review progress of recovery efforts and convey results to the Director(s) and the ESCC. Recovery is being implemented on an adaptive management basis, such that recovery actions will be modified pending need and success. The Team is considering developing a rating system to help determine whether actions are being implemented and objectives are being met. In addition to an annual review, there will be a comprehensive review of the Recovery Plan and progress after five years, at which time grizzly bear population size and trends, mortality rates, and need for recovery will be evaluated (see Appendix 1).

### 9.1 Progress Reporting

In addition to an annual evaluation, a publicly accessible annual report[3] is critical to support recovery objectives. Reporting needs to be credible and complete in order to build trust and support for the Plan. Reporting will adhere to the following principles:

- Transparent – full disclosure of the processes, procedures, and assumptions,
- Inclusive – systematically engage all of the stakeholders,
- Reliable – data and information should be recorded, compiled, analysed, and disclosed,
- Complete – include all necessary information for end users implementing and following the elements of the Plan,

---

[3] **Annual Report** – Issued within 90 days of evaluation completion, and will include but not be limited to:

- A clear numerical estimate of the current population, on a provincial and per BMA basis (if available),
- A roll-up of all data supplied by Regional Teams relative to their actions and progress,
- Data on all the indicators as defined in Objectives,
- An analysis of all mortality, human conflict, and relocation data as recorded in the provincial database,
- A statement on the general and specific progress of the Plan implementation,
- A comprehensive evaluation of the effectiveness for all elements of the Plan.
- A list of recommendations to the Director for changes and improvements to the Plan.

- Accurate – achieve the degree of exactness and low margins of error in reported information necessary for users to make decisions with a high degree of confidence,
- Neutral – avoid bias in selection and presentation of information such that a balanced account of performance is given,
- Comparable – maintain consistency in the boundary and scope of reports, and disclose any changes,
- Clear – remain cognizant of the diverse needs and values of stakeholder groups and make information available that is responsive to the maximum number of users, and
- Timely – report on a regular schedule that meets users needs.

## 9.2 Recognized Challenges for Recovery Actions

Having identified recovery actions, it is important to recognize associated challenges that need to be addressed during implementation (these do not preclude feasibility of recovery), and should be monitored accordingly.

It will be a challenge to:

- Implement consequences for illegal access use because it requires extensive field presence and adequate regulations.
- Achieve open route density targets due to the current lack of regulations or other mechanisms
- Evaluate conflicting land use priorities (e.g., ind ıstrial versus recreational access densities) and resolve conflicts due to lack of standardized process
- Set priorities for grizzly bears as part of an overall resource use prioritization process; this can be a slow and complex process, requiring strong political and public resolve.
- Acquire new funding for additional resources and staff due to current fiscal constraints
- Engage Albertans in grizzly bear recovery (i.e., to understand the Plan and what it means, in order to build support) because many people have limited exposure to, and understanding of, grizzly bears and their habitat
- Ensure that no one element of society pays disproportionately to recover grizzlies - recovery must be shared

Some components of the Plan will require further discussion, but implementation should proceed keeping these points in mind:

- The Plan recommends creation of GPAs which all members agree is important to success of recovery; however, not all members agree that the size and extent of those articulated in the Plan will be adequate to achieve recovery.
- The Plan recommends an immediate suspension of the hunt to reduce human-caused mortality; however, not all members agree that a blanket suspension across all BMAs is necessary at this time.
- Deferrals are a consideration for GPAs; however, other proposed mechanisms will likely be more effective at regulating human use. Under justifiable

circumstances and when other mechanisms fail, deferrals could be considered under a formal process. Implications regarding legal tenure agreements and compensation will require thorough discussion.

## 10.0 REFERENCES


Alberta Fish and Wildlife Division. 1990. Management Plan for grizzly bears in Alberta. Wildlife Management Planning Series Number 2. Alberta Fish and Wildlife Division, Alberta Forestry Lands and Wildlife. 164pp.

Alberta Sustainable Resource Development. 2007. The 2005 general status of Alberta wild species. URL: http://srd.alberta.ca/fishwildlife/wildspecies/index.htm [Updated January 2007].

Archibald, W. R., R. Ellis, and A. N. Hamilton. 1987. Responses of grizzly bears to logging truck traffic in the Kimsquit River valley, British Columbia. Int. Conf. Bear Res. and Manage. 7:251 – 257.

Aune, K. and W. Kasworm. 1989. Final report East Front grizzly bear study. Montana Department of Fish, Wildlife and Parks. Helena, MT. 332pp.

Banci, V. 1991. The status of the grizzly bear in Canada in 1990. COSEWIC, Ottawa, ON. 171pp.

Benn, B. 1998. Grizzly bear mortality in the central Rockies ecosystem, Canada. Eastern Slopes Grizzly Bear Project 1: 151.

Bergman, C. 2003. Southwestern Alberta Grizzly Bear Strategy (SWAGS), 2002-2003 Annual Progress Report. Report prepared for the Alberta Conservation Association, Edmonton, Alberta. 16 pp.

Blanchard, B.M. and R.R. Knight. 1995. Biological consequences of relocating grizzly bears in the Yellowstone ecosystem. Journal of Wildlife Management. 59: 560-565.

Boyce, M. S. 1989. The Jackson Elk Herd. Cambridge University Press.

Caro, T. M. 2003. Umbrella species: critique and lessons from East Africa. Animal Conservation. 6: 171-181.

Clark, T. W., A.R. Willard, and C. M. Cromley. 2000. Foundations of natural resources policy and management. Yale University Press, New Haven, CT.

Craighead, J. C. and F. C. Jr. Craighead. 1972. Grizzly bear-man relationships in Yellowstone National Park. Int. Conf. Bear Res. And Manage. 2:304-32.

Craighead, J. J., K. R. Greer, R. R. Knight, and H. I. Pac. 1988. Grizzly bear mortalities in the

Yellowstone ecosystem 1959 – 1987. Mont. Dept. Fish, Wildl. And Parks, Craighead Wildlife-Wildlands Inst., Interagency Grizzly Bear Study Team and Natl. Fish and Wildl. Found. Bozeman, MT, 102pp.

Craighead, L., D. Paetkau, H.V. Reynolds, E. R. Vyse, and C. Strobeck. 1995. Microsatellite analysis of paternity and reproduction in arctic grizzly bears. Journal of Heredity 86: 255-261.

Dood, A. R., R. D. Brannon, and R. D. Mace, R. D. 1986. Final programmatic environmental impact statement: The grizzly bear in northwestern Montana. Montana Dept. of Fish, Wildl. And Parks. Helena, MT.

Garshelis, D.L., M.L. Gibeau and S. Herrero. 2004. Grizzly bear demographics in and around Banff National Park and Kananaskis Country, Alberta. Journal of Wildlife Management In Press.

Gau, R. J. 1998. Food habits, body condition, and habitat of the barren-ground grizzly bear. Thesis. University of Saskatchewan, Saskatoon. 77pp

Gibeau, M.L. 1998. Grizzly bear habitat effectiveness model for Banff, Yoho, and Kootenay National Parks. Ursus 10: 235-241.

Gibeau, M.L. 2000. A conservation biology approach to management of grizzly bears in Banff National Park. Ph.D. thesis, Resources and the environment program, University of Calgary, Calgary, AB, Canada. 129 pp.

Gibeau, M., S. Herrero, J. Kansas and B. Benn. 1996. Grizzly bear populations and habitat status in Banff National Park: A report to the Banff Bow Valley Task Forse. 61pp.

Gibeau, M.L., S. Herrero, B.N. McLellan, and J.G. Woods. 2001. Managing for grizzly bear security areas in Banff National Park and the Central Canadian Rocky Mountains. Ursus 12:121-130.

Gibeau, M.L., A.P. Clevenger, S. Herrero and J. Wierchowski. 2002. Grizzly bear response to human development and activities in the Bow River watershed, Alberta. Biological Conservation. 103:227-236

Gibeau, M. and S. Stevens. 2003. Grizzly bear monitoring in the Bow River watershed: A progress report for 2002. Unpubl. Report. 26pp.

Government of British Columbia. 2007. B.C. Conservation Data Centre. BC Species and Ecosystem Explorer. http://srmapps.gov.bc.ca/apps/eswp/

Government of Northwest Territories. 2008.
http://www.nwtwildlife.com/NWTwildlife/bears/grizzlybear/management

Government of Yukon. 2008.
http://environmentyukon.gov.yk.ca/wildlifebiodiversity/speciesrisk.php

Hamer, D., S. Herrero, and K. Brady. 1981. Studies of the grizzly bear in Waterton Lakes National Park. Parks Canada 1: 51.

Harris, R.B., 1986. Modeling sustainable harvest rates for grizzly bears. In A. E. Dood, R. D.

Brannon, and R. D. Mace, Editors. Final programmatic environmental impact statement: The grizzly bear in northwestern Montana. Montana Department of Fish, Wildlife and Parks, Helena, Montana. 287 pp.

Herrero, S. 1978. A comparison of some features of the evolution, ecology and behaviour of black and grizzly/brown bears. Carnivore 1(1): 7-17.

Horejsi, B. J. 1986. Industrial and agricultural incursion into grizzly bear habitat: The Alberta story. P 116-123. *In:* Contreras, G. P. and Evan, K. E. Proceedings grizzly bear habitat symposium. 1985. Missoula MT.

Kansas, J. L. 2002. Status of the grizzly bear (*Ursus arctos*) in Alberta. Alberta Sustainable Resources Development, Fish and Wildlife Division, and Alberta Conservation Association, Alberta Wildlife Status Report No. 37, Edmonton, AB. 43pp.

Kasworm, W.F. and T. L. Manley. 1990. Road and trail influences on grizzly bears and black bears in northwest Montana. International Conference on Bear Research and Management 8: 79-84.

Knight, R. R. and L. L. Eberhardt. 1985. Population dynamics of Yellowstone grizzly bears. Ecology 66:323-34.

Knick, S. T. and W. Kasworm. 1989. Shooting mortality in small populations of grizzly bears. Wildl. Soc. Bull. 15:11-5.

LeFranc, M.N., M.B. Moss, K.A. Patnode, and W. C. Sugg. Editors. 1987. Grizzly bear compendium. Interagency Grizzly Bear Committee and National Wildlife Federation, Washington D.C.

Mattson, D.J. 1993. Background and proposed standards for managing grizzly bear habitat security in the Yellowstone ecosystem. Managing Grizzly Bear Habitat Security. 17pp.

Mattson, D. J., R. R. Knight, and B. M. Blanchard. 1987. The effects of developments and primary roads on grizzly bear habitat in Yellowstone National Park, Wyoming. Int. Conf. Bear Res. and Manage. 7:259-73.

Mattson, D. J. and T. Merril. 2002. Exterpations of grizzly bears in the contiguous United States, 1850-2000. Conservation Biology 16: 1123-1136.

Mattson, D.J., H. Stephen, R. G. Wright, and C. M. Pease. 1996. Science and management of Rocky Mountain grizzly bears. Conservation Biology 10: 1013-1025.

McLellan, B.N. 1990. Relationships between human industrial activity and grizzly bears. International Conference on Bear Research and Management 8:57-64. (569).

Mclellan, B.N. and F. W. Hovey. 1995. The diet of grizzly bears in the Flathead drainage of southeastern British Columbia. Canadian Journal of Zoology 73: 704-712.

McLellan, B.N. and F. W. Hovey. 2001. Habitats selected by grizzly bears in a multiple use landscape. Journal of Wildlife Management 65: 92-99.

McLellan, B.N. and F. W. Hovey. 2001. Natal dispersal of grizzly bears. Canadian Journal of Zoology 79: 838-844.

McLellan, B.N., F. W. Hovey, R. D. Mace, J. D. Woods, D. W. Carney, M. L. Gibeau, W. L. Wakkinen, and W. F. Kasworm. 1999. Rates and causes of grizzly bear mortality in the interior mountains of British Columbia, Alberta, Montana, Washington, and Idaho. Journal of Wildlife Management 63: 911-920.

McLellan, B. N. and R. D. Mace. 1985. Behaviour of grizzly bears in response to roads, seismic activity and people. Canadian Border Grizzly Project. University of British Columbia, Vancouver. 53pp.

McLellan, B.N. and D. M. Shackleton. 1988. Grizzly bears and resource-extraction industries: effects of roads on behaviour, habitat use and demography. Journal of Applied Ecology 25: 451-460.

McLoughlin, P. D. 2003. Managing risks of decline for hunted populations of grizzly bears given uncertainty in population parameters. *For:* British Columbia Independent Scientific Panel on Grizzly Bears. University of Alberta, Edmonton AB. 63pp.

McLoughlin, P. D., S. H. Ferguson, and F. Messier. 2000. Intraspecific variation in home range overlap with range quality: a comparison among brown bear populations. Evolutionary Ecology 14:39 – 60.

McLoughlin, P. D., R. L. Case, R. J. Gau, S. H. Ferguson, and F. Messier. 1999. Annual and seasonal movement patterns of barren-ground grizzly bears in the central Northwest Territories. Ursus 11:79 – 86.

Mealey, S.P. 1975. The natural food habitats of free ranging grizzly bears in Yellowstone National Park, 1973-1974. Thesis 158 pp.

Miller, S. D. 1990. Population management of bears in North America. Int. Conf. Bear Res. and Manage. 8:357-373.

Mundy, K.R.D. and D.R. Flook. 1973. Background for managing grizzly bears in the National Parks of Canada. Canadian Wildlife Service Report No. 22, 35 pp.

Munro, R. and T. Hamilton. 1996. A review of grizzly and black bear translocations in British Columbia. Report prepared for the Ministry of Environment, Lands and Parks, British Columbia.

Nagy, J.A. 1984. Linear distances of grizzly bears from roads in Swan Hills. Unpublished report, Wildlife Biology Group, Animal Science Wing. (146).

Nagy, J. A. and M. A. Haroldson, 1990. Comparisons of some home range and population parameters among four grizzly bear populations in Canada. Int. Conf. Bear Res. And Manage. 8:227 – 235.

Nagy, J.A., A.W.L. Hawley, M. W. Barrett, and J. W. Nolan. 1989. Population characteristics of grizzly and black bears in West Central Alberta. AEC Report V88-R1. Alberta Environmental Centre, Vegreville.

Nagy, J.A. and R. H. Russell. 1978. Ecological studies of the boreal forest grizzly bear-annual report for 1977. Canadian Wildlife Service. 72pp.

Nelson, P. L. 1975. The past and present status of the plains and boreal forest grizzly bears in Alberta. Unpublished Report.

Nielson, S.E., S. Herrero, M.S. Boyce, R. D. Mace, B. Benn, M. L. Gibeau, and S. Jovons. 2004a. Modelling the spatial distribution of human-caused grizzly bear mortalities in the central Rockies ecosystem of Canada. Biological Conservation 120:101-113.

Nielsen, S.E., M.S. Boyce, G.B. Stenhouse,. 2004b. Grizzly bears and forestry I: Selection of clearcuts by grizzly bears in west-central Alberta, Canada. Forest Ecology and Management 199:51-65.

Nielsen, S.E., R.H.M. Munro, E.L. Bainbridge, G.B. Stenhouse, M.S. Boyce. 2004c. Grizzly bears and forestry II: Distribution of grizzly bear foods in clearcuts of west-central Alberta, Canada. Forest Ecology and Management 199:67-82.

Paetkau, D., G. F. Shields, and K. Strobeck. 1998. Gene flow between insular, coastal and interior populations of brown bears in Alaska. Molecular Ecology 7, 1283-1292.

Paetkau, D., L.P. Waits, P.L. Clarkson, L. Craighead, E. Vyse, R. Ward, and C. Strobeck. 1998. Variation in genetic diversity across the range of North American brown bears. Conservation Biology 12:418-429.

Pearson, A.M. 1975. The northern interior grizzly bear *Ursus arctos* L. Canadian Wildlife Service Report Series 34. Ottawa, Canada. 84 pp.

Proctor, M. F. 2003. Genetic analysis of movement, dispersal and population fragmentation of grizzly bears in southwestern Canada. PhD Thesis. University of Calgary. 157pp.

Puchlerz, T., and C. Servheen. 1998. Interagency Grizzly Bear Committee access management task force report. Denver, CO. Interagency Grizzly Bear Committee. 6pp.

Ross, P. I. 2002. Update COSEWIC status report on grizzly bear (*Ursus arctos*).

Ruediger, B. 1996. The relationship between rare carnivores and highways. *In:* Evink, G. L., Garrett, P., Zeigler, D. and Berry, J. eds. Trends in addressing transportation related wildlife mortalities: Proceedings of the Transportation Related Mortality Seminar, 1996. Orlando, Florida.

Russell, R.H., J. W. Nolan, N. G. Woody, and G. H. Anderson. 1979. A study of the grizzly bear in Jasper National Park, 1975 to 1978. Canadian Wildlife Service. 136pp.

Servheen, C. 1985. Grizzly bear food habits, movements and habitat selection in the Mission Mountains, Montana. Journal of Wildlife Management 47: 1026-1035.

Stenhouse, G., M. Boyce, and J. Boulanger. 2003. Report on Alberta grizzly bear assessment of allocation. Alberta Fish and Wildlife Division. Unpubl. Report.

Stenhouse, G., R.Munro and K.Graham. 2003a. Foothills Model Forest Grizzly Bear Research Program 2002 Annual Report. 162 pp.

Stenhouse, G., M. Boyce, J. Boulanger. 2003b. Report on Alberta grizzly bear assessment of allocation. Alberta Fish and Wildlife Division, unpubl. report.

Stenhouse, G., J.Dugas, J.Boulanger, D.Hobson, and H. Purves. 2003c. Grizzly Bear Cumulative Effects Assessment Model Review For the Regional Carnivore Management Group. Zager, P., C. Jonkel, and J. Habeck. 1983. Logging and wildfire influence on grizzly bear habitat in Northwestern Montana. International Conference on Bear Research and Management 5:124-132. (339)

Straley, J. H. 1968. Population analysis of ear-tagged elk. Proceedings of the Western Association of
State Game and Fish Commissioners, 48:152-160.

Titus, K. and L. Beier. 1992. Population and habitat ecology of brown bears on Admiralty and Chichigof Islands. Federal Aid in Restoration Research Project Report W-23-4. Alaska Dept. of Fish and Game, Div. Wildl. Conservation. Juneau, Alaska.

US Fish and Wildlife Service, 2003. Final conservation strategy for the grizzly bear in the Greater Yellowstone Area.. Report prepared by the Interagency Conservation Strategy Team, Missoula MT. 160pp

USDA Forest Service. 1990. CEM - A model for assessing effects on grizzly bears. USDA Forest Service, Missoula, Montana, USA.

Zager, P. E. and C. J. Jonkel. 1983. Managing grizzly bear habitat in the northern Rocky Mountains. J. Forestry 81 (8): 524-6.

## 11.0 GLOSSARY

**Access controls** – Effective methods of controlling motorized use of roads or trails (e.g. signs backed up by regulation, monitoring and policing, as well as physically blocking of routes by gates, bridge or culvert removal, road reclamation)

**Adaptive management** – is an active flexible management strategy in which managers monitor the results of management practices using habitat and population data and respond as necessary with management changes. An adaptive management plan includes three critical elements:

1. Conceptual and quantitative models that make explicit the current understanding of the system, the underlying driving management, and key uncertainties;
2. Rigorous monitoring plans focused on reducing the most critical uncertainties and clearly evaluating progress towards management goals; and
3. A scientifically defensible plan for monitoring and research including rapid feedback from management outcomes to revised management decisions.

**Bear management area (BMA)** – A management unit based on individual grizzly bear population units or specific management programs which may differ from other BMAs

**DNA inventory** – A wildlife inventory method using baited sites surrounded by barbed wire to collect hair samples. DNA analysis of hair samples used to estimate population size

**Environmental Field Report (EFR)** - The Environmental Field Report (EFR) is a generic form outlining the minimum information required for each surface disposition application. Using the EFR, the applicant describes how a site will be constructed and reclaimed to meet acceptable environmental standards and comply with legislation administered by Sustainable Resource Development. An EFR must be submitted for all surface disposition applications as required under the *Public Lands Act*. The EFR does not address requirements subject to other legislation, such as the *Water Act* and *Water (Ministerial) Regulation*, and the *Alberta Environmental Protection and Enhancement Act* and its regulations

**Forest Land-use Zone (FLUZ)** – A FLUZ is an area of land to which legislative controls are applied under authority of the *Forests Act*. A FLUZ is created specifically for that landbase and the conditions that exist within it. Each FLUZ can vary greatly on what is or is not permitted

**Grizzly Bear Priority Area (GPA)** – A designated area of high quality grizzly bear habitat where risk of human-caused mortality is reduced through restrictions of access development and use and other activities; within GPAs, grizzly bear conservation is the major non-economic resource consideration in land-use planning

**Independent bear** – Individual bear that is not dependent on its mother, but is not necessarily reproductively mature

**Interagency Grizzly Bear Committee (IGBC)** – Committee dedicated to a coordinated approach to grizzly bear research and management, with representation from: US Fish and Wildlife Service, USDA Forest Service, National Parks Service, Bureau of Land Management, US Geological Survey, State Wildlife Management Agencies, British Columbia Ministry of Environment Wildlife Branch, and Parks Canada

**Linear disturbance** – Human-caused linear features on the landscape (i.e. power lines, cut lines, seismic lines, roads)

**Mortality risk model** - A mathematical model that takes into account habitat features and access information to identify risk of human-caused mortality to a grizzly bear (see Nielsen *et al* 2004a).

**Occupancy** – Presence of female grizzly bear with cubs (*i.e.*, not transitory)

**Resource selection function (RSF)** – A model to quantify bear use of a landscape using multiple logical regression to perform a use vs. availability analysis.

**Road deactivation** – Conducting operational activities (bridge removal, etc.) to prevent or restrict vehicle travel on roads, while maintaining future options to reopen the road for management activities (e.g. fire suppression, silvicultural activities).

**Road reclamation** – Removal of the road base structure, which would not allow for future vehicle access on the road. This process usually involves the removal of gravel fill, and returning the roaded area to its original slope and vegetative state.

**Self-sustaining population** – A population that maintains its size without the need for immigration of individuals from other populations, translocation of individuals by humans, or input from captive breeding programs

## APPENDICIES

### APPENDIX 1
### Recovery Achievement and Hunting Resumption

Recovery will be "achieved" if the following factors are met, at which time hunting may resume on a BMA basis. These factors are listed in a sequential order and should not be taken in isolation.

1. Is there a current population estimate for the BMA (i.e., within 5 years), using a DNA census (base decisions on conservative interpretation from the estimate) or habitat-based density extrapolations.
   - If no, recovery can not be evaluated and hunting should not occur
   - If yes, proceed to 2 to continue recovery evaluation. Hunting should not resume if inventory data indicates that watershed units adjoining the population unit have no female bears present during the sampling period.

2. Using the new and current population estimate (N) for a BMA, conduct a review of this population estimate in relation to:
   a. estimates of capability of the landscape to support grizzly bears, including habitat quality and quantity (current landscape conditions),
   b. expected population densities from current literature (#bears/1000km2),
   c. demographic data (sex ratio) from census work, and
   d. the spatial distribution of grizzly bears within the BMA and adjacent jurisdictions. We recommend that this review and analysis be conducted by the proposed Interagency Advisory Group within a year following the completion of a BMA census. Based on this evaluation, and input from Regional Teams regarding regional considerations (such as social factors), the Recovery Team will recommend a population recovery target to the Director.
   - If N is below 90% of the population target, recovery has not been achieved (90% is an arbitrary, interim value chosen by the Team as a reasonable and conservative indication that the population size is moving towards the population target, taking into account the slow reproductive rate of grizzly bears). It will be important to integrate and review any available population trend data when determining population status as it relates to the 90% target. It is recognized that long-term inventory data will be required.
   - If N is above 90% of the population target, proceed to review other criteria below.

3. Evaluate known human caused mortality rate within this population unit over the past 6 years.
   - If rate is above 4%, recovery has not been achieved (note: hunting mortalities should not bring total human-caused mortality over 4%)
   - If rate is below 4%, review trends in data related to age, sex (females should account for less than 30% of total mortalities), and mortality type. Pending results of trend review, proceed to 4.

4. Review the number and type of bear/human conflicts and number of bear relocations over the last 3-5 years (once BMA population estimates are available, a rate can be determined) to help evaluate efficacy of education and management. Number of conflicts is not indicative of population size, rather, it is indicative of level of risk to bears (i.e., an increase in conflicts may be a result of an increased bear population, but may also be a result of increased human activity. Similarly, a decrease in conflicts may be a result of a decreased bear population, or a result of improved management). In addition to the number of conflicts, the following aspects should be considered:
   - Are there ongoing problems or new concerns relative to human use of the landscape?
   - Are there management actions in place or planned to address observed conflicts?
   - What is the social context (opinions/concerns of stakeholders, landowners, etc.) related to the human/bear conflicts?
   - What has been the management response to documented conflicts (was aversive conditioning used? Were bears relocated? Were bears euthanized)?

5. Determine if there is significant risk to grizzlies within the BMA, ideally using mortality risk models (in the absence of models, review current and proposed land use development and activities). Evaluate implications for recovery and hunting accordingly.

   Note: When repeated inventory data are available, population trends should be evaluated. A stable or increasing trend suggests that recovery may have been achieved

## APPENDIX 2
## Regional Grizzly Bear Recovery Implementation Teams

### A. Terms of Reference

*Purpose*

**A number of actions in the Recovery Plan need to be addressed at a region level. For this reason, Regional Grizzly Bear Recovery Implementation Teams (Regional Teams) are required to act as planning bodies to advise on regional priorities, and where appropriate, participate in implementing recovery actions. The Regional Team concept is consistent with National Recovery Implementation Groups (National Recovery Working Group 2004) and the Regional Subcommittee of the IGBC.**

*Duties*

Regional Teams will adhere to the goal, objectives and strategies of the Recovery Plan, and determine recovery actions relevant to their regions, following Recovery Plan recommendations, i.e., create a regional implementation plan. Members will work co-operatively to determine regional priorities, recommend actions, and participate in grizzly recovery. Regional Teams must recognize that government and stakeholders have endorsed the Recovery Plan. In other words, recovery strategies and actions do not need to be reviewed; rather, regional priorities need to be identified. Implementation is contingent on approval from the Director of Wildlife, and where access management is concerned, the Forest Operations Director.

*Distribution of teams*

The Recovery Plan recommends one Regional Team per BMA, except for the northwest where three teams would be more appropriate (e.g., 1: BMA 1 northern section, BMA 2A north of Peace River, 2: Swan Hills, 3: remainder of BMA 2A, BMA 2B). However, for functional reasons (e.g., management regions, conflict types), it may be more appropriate to organize Teams differently. Consequently, Directors should review the recommended number and distribution of Regional Teams through consultation with regional staff.

*Membership Composition*

The Directors of Wildlife and Forest Management will jointly determine membership of Regional Teams. In regions where federal lands are in grizzly range, Directors from Parks Canada and/or Environment Canada will assist in membership determination. Where appropriate, other representation will roughly parallel Recovery Team membership, to ensure a multi-stakeholder team with appropriate representation of regional issues. Regional Team operations may vary to better address specific issues and stakeholder preferences for consultation.

*Leadership and reporting structure*

A Fish and Wildlife Division (FWD) Biologist and a Sustainable Resource Development Land Management Specialist (familiar with regional bear management issues) should jointly lead and coordinate Regional Teams. The Provincial Grizzly Bear Recovery

Biologist will provide guidance and support for all Regional Teams, and ensure coordination between regions. A Regional Team coordinator will act as liaison and report to the Recovery Team, and may sit as a non-voting member of the Recovery Team.

*Regional plan review and approval*
The Regional Team coordinator will present regional implementation plans to the Recovery Team for review and updates at annual meetings. The Recovery Team may recommend modifications to implementations plans. Ultimately, plan approval lies with the Director(s).

*Integration with other planning initiatives*
It is essential to integrate grizzly bear recovery with other current and proposed regional planning initiatives. Current planning processes include Forest Management Planning (Detailed Forest Management Plans, Operating Ground Rules, and Annual Operating Plans) and Land Use Operations (Best Management Practices Guidelines/Operating Practices and Area Operating Agreements/Environmental Field Reports). Proposed initiatives include a Watershed Planning and Advisory Council and an Access Management Program, the latter of which will be particularly important for implementation of access related recovery actions.

**B. Responsibilities**

The primary responsibility of Regional Teams is to recommend actions necessary to recover and conserve grizzly bears within a regional context through preparation of a regional implementation plan. Implementation plans should outline specific actions, timelines, and required resources, using the prioritized action table and implementation schedule in the Recovery Plan for guidance. These plans should be completed in a timely manner, with emphasis on determining GPAs within one year of Recovery Plan approval. It is important to reiterate that this process is not intended to duplicate efforts of the Recovery Team; Regional Teams will follow guidelines and recommendations in the Plan.

Regional Teams are required to address the following recovery actions in regional implementation plans:

- Identify and delineate GPAs; follow guidelines (in Table 3) to determine land management activities and other considerations, involving stakeholders at a suitable stage of development
- Identify grizzly habitat in grizzly bear dispersal zones; follow guidelines as per above
- Evaluate regional grizzly management needs and recommend actions based on direction from Recovery Plan (e.g., aversive conditioning, intercept feeding, etc.; refer to regional management issues and needs, Table 2), and participate with implementation accordingly
- Coordinate with other regional planning initiatives and other jurisdictions
- Provide guidance for conflict prevention/problem wildlife positions (local focus)
- Provide guidance for education program (local focus)

- Provide annual summaries to Provincial Grizzly Bear Recovery Team (summaries will address progress and issues – Recovery Team can try to address issues, such as regulatory gaps, and bring them forward to Director)

## APPENDIX 3
## Example of Grizzly Bear Priority Area (GPA) delineation

The following example demonstrates one approach for the selection of Grizzly Bear Priority Areas (GPAs). This is an example only and shows how new research and ongoing management initiatives can be utilized for the selection of GPAs. Refer to accompanying figures which follow the steps listed below.

1. The area used in the example is south of Highway 16 along the eastern slopes (Figure 1), where extensive data sets and habitat mapping exist from the Foothills Model Forest Grizzly Bear Research Study, from 1999-2003.
2. The first step is to understand the current level of road access on the landscape. It should be noted that the roads shown in figure 2 are all weather gravel roads. Trails, powerlines and pipelines are not shown but should be considered in GCA selection.
3. A road density surface map was generated that shows the road density in $km/km^2$ (Figure 3). With a road density target of 0.6 $km/km^2$, the majority of the two highest density road density categories meet or exceed this value. The importance of this analysis is to show land managers the spatial configuration of the existing road network in relation to the landscape.
4. Using a Resource Selection Function (RSF) map (from Nielsen 2005; Figure 4), the areas of highest probability of grizzly bear occurrence were identified. This map was created to show an annual probability of occurrence, however seasonal maps of this nature are also possible.
5. A GPA was then selected to optimize the inclusion of areas of high probability of grizzly bear occurrence where existing road densities were largely (but not exclusively) below 0.6 $km/km^2$ (Figure 5). In this example, the total area of the GPA is approximately 2200 $km^2$, which is somewhat smaller than the recommended minimum size of 2400 $km^2$ (4 adult female home ranges: 4x600 $km^2$). Adjacent population units should also be considered to maintain connectivity.
6. Reviewing the percentages of high RSF scoring habitats within the GPA relative to the entire study area (Figure 6) ensures that the GPA has a high probability of grizzly bear occurrence, while minimizing access features.

Figure A1. Portion of the FMF study area used for this example.

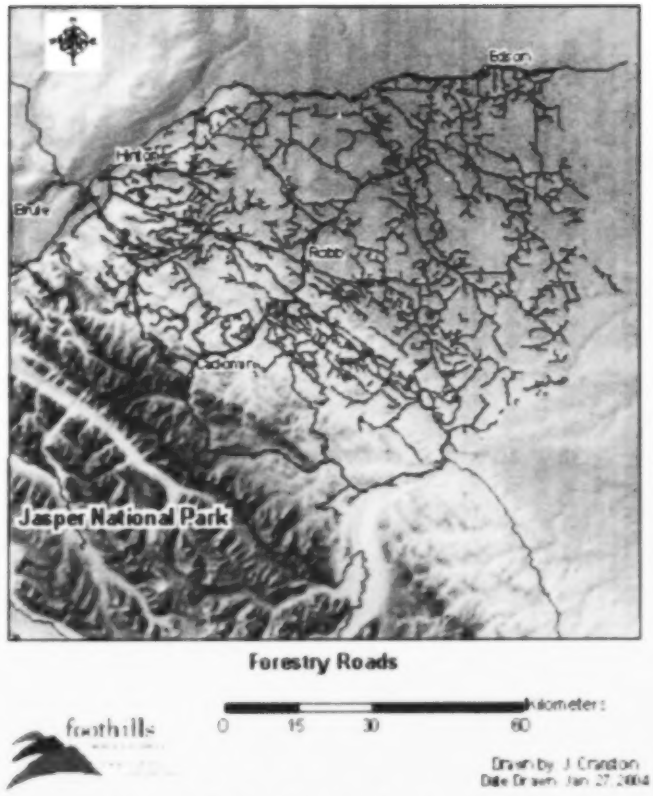



Figure A2. Existing road network within study area.

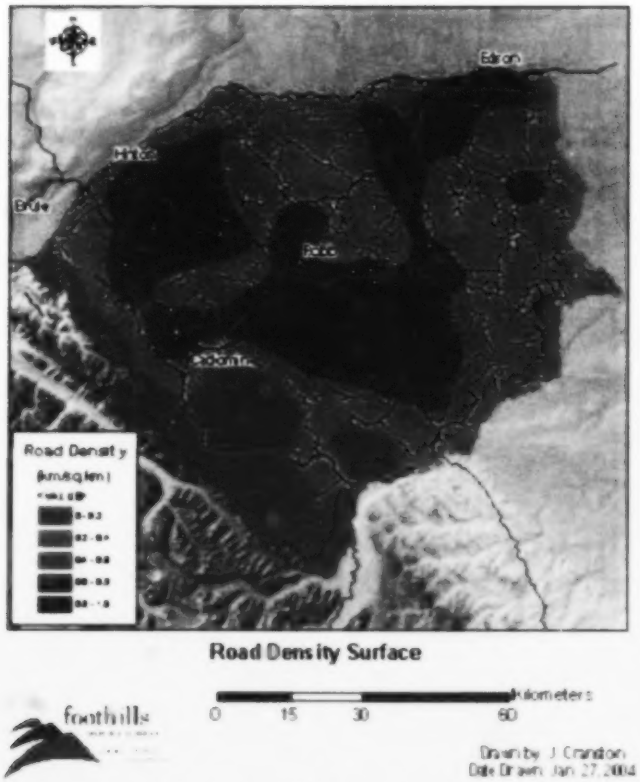



Figure A3. Road density analysis summary by category for the study area.

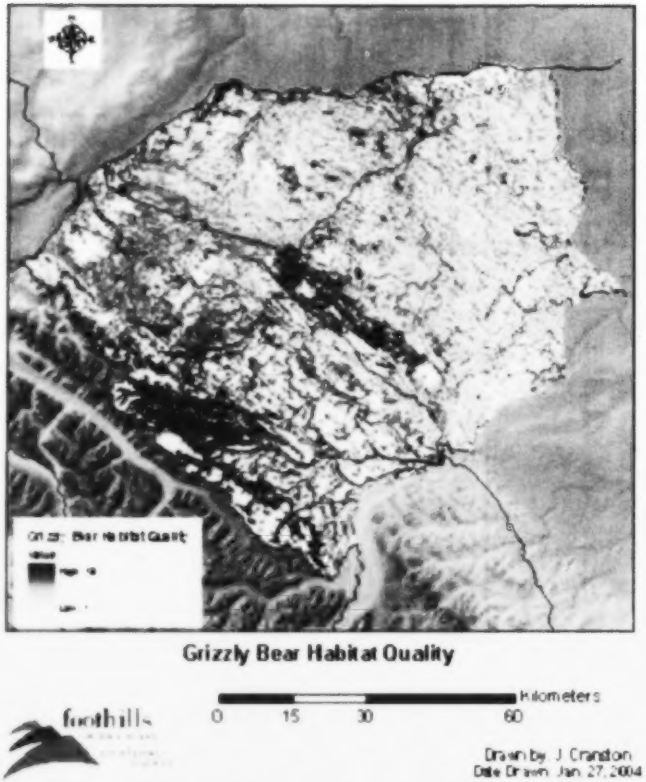



Figure A4. RSF map showing annual probability of grizzly bear occurrence

Figure A5. Grizzly Bear Priority Area selected using RSF data and road densities for the study area.

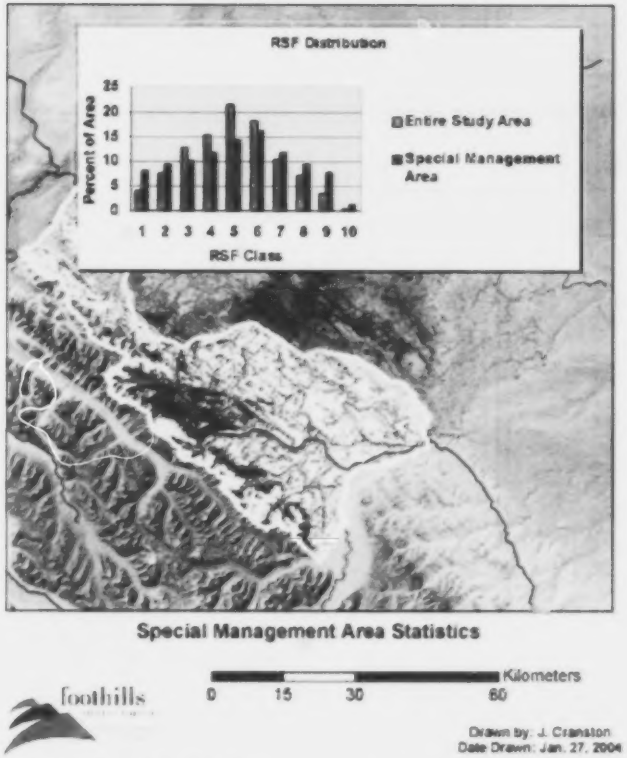
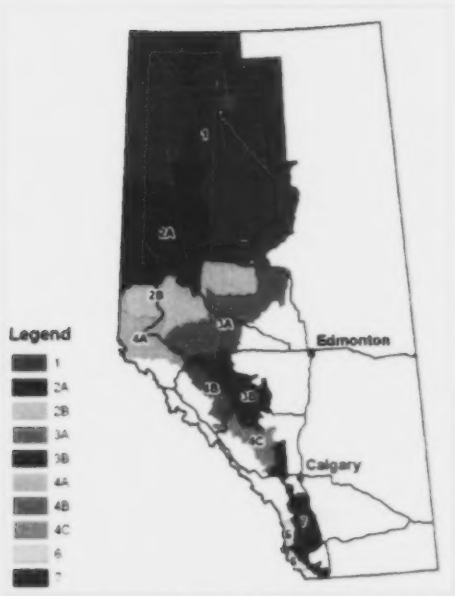
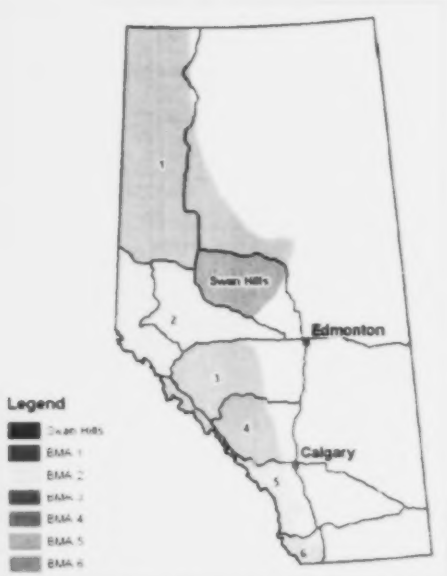



Figure A6. RSF summary statistics for GPA example selected.

**APPENDIX 4**
**Current and proposed Bear Management Areas (BMAs) within grizzly bear range**




Current Bear Management Areas (BMA's)




Proposed Bear Management Areas (BMA's)

## APPENDIX 5
## Schedules for inventory and habitat mapping

**Table A1. Proposed schedule of Grizzly Bear Habitat Mapping (using remote sensing)[1].**

| BMA | Schedule | Status |
|---|---|---|
| between Hwy. 16 and 11 **(Unit 3)** | 2004 | completed |
| between Hwy. 11 and 1 **(Unit 4)** | 2005 | completed |
| between Hwy. 1 and 3 **(Unit 5)** | 2006 | completed |
| south. of Hwy. 3 **(Unit 6)** | 2007 | field work in 2007 and delivery planned for 2008 |
| Grande Cache **(Unit 2)** | 2008 | field work planned for 2008 with delivery planned for 2009 |
| north. of Grande Cache **(Unit 1)** | TBA | no concrete plans for this work at present |

[1] This schedule is dependent on the continued and ongoing levels of financial support. Mapping cost is dependent on size of area and availability of staff time and test data set collection, approximately $50K per BMA.

**Table A2. Proposed DNA census schedule for grizzly bear population units (BMA)[1].**

| BMA | AREA ($km^2$) | 1st Census | Budget[2] ($K) | Return Year for Trend |
|---|---|---|---|---|
| Unit 3 | 28,529 | 2004 | 457 | 2009 |
| Unit 4 | 17,628 | 2005 | 420 | 2010 |
| Unit 5 | 10,841 | 2006 | 408 | 2011 |
| Unit 6 | 6,076 | 2007 | 485 | 2012 |
| Unit 2 | 48,617 | 2008 | 300 | 2013 |
| Unit1 | 144,000 | ? | TBA | TBA |

[1]This schedule can be amended based on provincial priorities and land management needs, however habitat maps and RSF products need to be completed before DNA census work begins. Therefore the census schedule needs to link with the mapping schedule. Large BMA units may require different sampling approaches which cannot be accurately projected at this time.

[2] Cost of census work is dependent on size of area and availability of staff time and data set collection.

## APPENDIX 6

**Grizzly bear conflict and mortality rates by Wildlife Management Unit (WMU), 1990-2003**

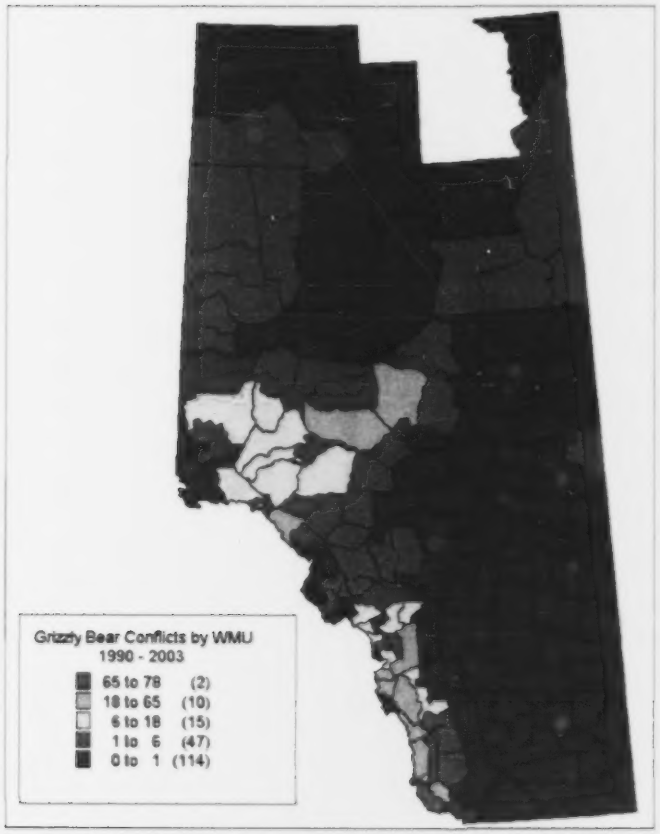



**Figure A7. Total grizzly bear conflicts by WMU, 1990 – 2003*.**

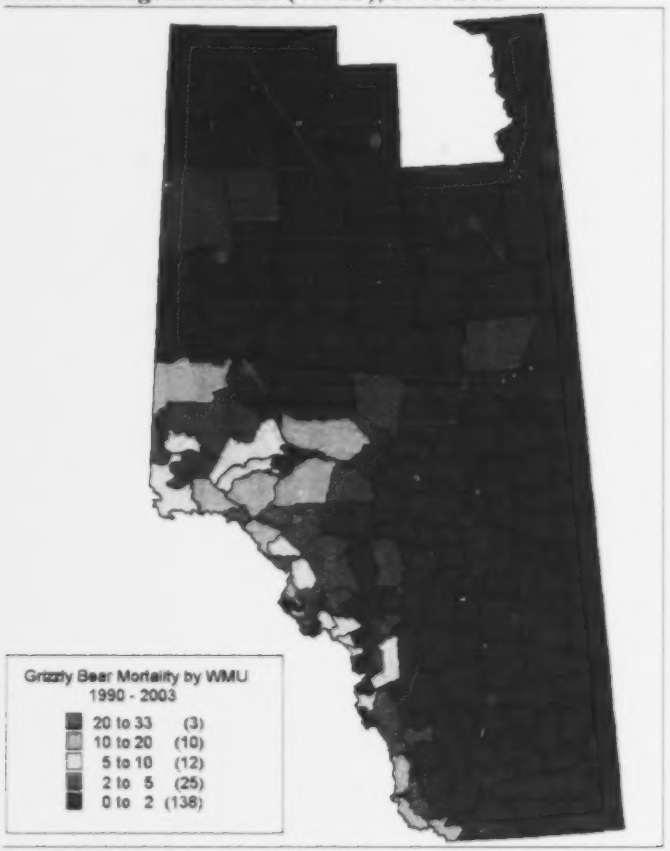



**Figure A8. Total known grizzly bear mortalities by WMU, 1990 – 2003*.**

* Numbers based on Alberta Fish and Wildlife unpublished data

## APPENDIX 7
## Example of Attractant Storage Order

**United States Department of Agriculture**
**Forest Service**
**Rocky Mountain Region—Shoshone National Forest**
**Intermountain Region—Bridger-Teton National Forest**

### OCCUPANCY AND USE RESTRICTIONS

For the purpose of minimizing adverse interactions between bears and humans and pursuant to Title 36 Code of Federal Regulations (CFR), 261.50 (a) and (b), the following uses are restricted in those areas of the Shoshone National Forest and the Bridger-Teton National Forest as shown on the attached map (Exhibit B) and hereby made part of this Order. Also attached, and hereby made part of this Order, are Definitions (Exhibit A) of terms used in support of the restrictions. This Order is effective March 1 through December 1, annually, until rescinded.

1. Possessing or storing any food or refuse, as specified in the Order (36 CFR 261.58 (cc).
2. Possessing, storing, or transporting any bird, fish, or other animal, or parts thereof, as specified in the Order (36 CFR 261.58 (s).
3. Camping as specified in the Order (36 CFR 261.58 (e).

### UNDER THIS ORDER IT IS REQUIRED THAT

1. All food and refuse must be acceptably stored or acceptably possessed during daytime hours.
2. All food and refuse must be acceptably stored during nighttime hours, unless it is being prepared for eating, being eaten, being transported, or being prepared for acceptable storage.
3. Any harvested animal carcass must be acceptably stored, unless the carcass is being field dressed, transported, being prepared for eating, or being prepared for acceptable storage.
4. Camping or sleeping areas must be established at least ½ mile from a known animal carcass or at least 100 yards from an acceptably stored animal carcass.

### EXEMPTIONS

Pursuant to 36 CFR 261.50 (e) the following persons are exempt from this Order:

1. Persons with a permit issued by the Forest Supervisor specifically exempting them from the effect of this Order.
2. Persons in the act of placing black bear baits for the lawful purpose of hunting black bears under state law and regulation.
3. Any Federal or State officer placing baits to capture animals for research or management purposes as part of their official duties.

These restrictions are in addition to the general prohibitions in 36 CFR Part 261, Subpart A. This Order supersedes any previous Order prohibiting or restricting the same, or similar, acts in the above-described areas.

**APPENDIX 8**
**Summary of proposed OHV rule in USA (July 2004)**

[3410-11-P]
**DEPARTMENT OF AGRICULTURE**
**Forest Service**
**36 CFR Parts 212, 251, 261, and 295**
**Travel Management; Designated Routes and Areas for Motor Vehicle Use**
**RIN 0596-AC11**
**AGENCY:** USDA, Forest Service.

---

**SUMMARY:** The Forest Service proposes to amend regulations regarding travel management on National Forest System lands to clarify policy related to motor vehicle use, including the use of off-highway vehicles. The proposed rule would require the establishment of a system of roads, trails, and areas designated for motor vehicle use. The proposed rule also would prohibit the use of motor vehicles off the designated system, as well as motor vehicle use on the system that is not consistent with the classes of motor vehicles and, if applicable, the time of year, designated for use. The establishment and clear identification of a transportation and use system for motor vehicles on each National Forest would enhance management of National Forest System lands; sustain natural resource values through more effective management of motor vehicle use; enhance opportunities for motorized recreation experiences on National Forest System lands; address needs for access to National Forest System lands; and preserve areas of opportunity on each National Forest for non-motorized travel and experiences. The proposed rule also would conform agency rules to the provisions of Executive orders 11644 and 11989 regarding off-road use of motor vehicles on Federal lands.

## APPENDIX 9
### Detailed schedule of high priority actions

| Recovery Action | Apr-Dec 08 | Jan-Apr 09 | Apr-Dec 09 | Jan-Apr 10 | Apr-Dec 10 | Jan-Apr 11 | Apr-Dec 11 | Jan-Apr 12 |
|---|---|---|---|---|---|---|---|---|
| **7.1 Reduce human-caused mortality** | | | | | | | | |
| 7.1.1 Suspend licensed hunt (will be reviewed annually) | | | | | | | | |
| 7.1.2. Manage access & land uses | | | | | | | | |
| a. Create Regional Grizzly Bear Recovery Implementation Teams | | | | | | | | |
| b. Delineate GPAs | | | | | | | | |
| c. Determine activities in GPAs | | | | | | | | |
| d. Determine activities outside GPAs | | | | | | | | |
| **7.2 Improve knowledge** | | | | | | | | |
| a. Determine population size and targets | | | | | | | | |
| b. Monitor populations | | | | | | | | |
| **7.3 Reduce conflicts** | | | | | | | | |
| a. Attractants control | | | | | | | | |
| b. Create conflict prevention positions | | | | | | | | |
| c. Improve relationships with ranchers | | | | | | | | |
| d. Hunter training | | | | | | | | |
| **7.4 Education program** | | | | | | | | |
| Develop and deliver program | | | | | | | | |
| **7.5 Identify, track and maintain habitat** | | | | | | | | |
| Continue model development to quantify bear habitat over time | | | | | | | | |

For those activities which require a planning stage before implementation, timelines are for planning stages only. Implementation will continue over subsequent years, the duration of which will depend, to some degree, on program success and need.

## APPENDIX 10
## DNA Census Results 2004-2006

**Table A3. DNA Grizzly Bear Survey Summary 2004-2006[1]**

| Year | Area Sampled | Grid Size (km) | # Sessions | # Sites | Indiv. Capture | Superpopulation[2] | *On Grid* |
|---|---|---|---|---|---|---|---|
| 2004 | 8820 km2 | 7x7 | 4 | 108 | 39 | N=53 (SE 8.3, CI =44-80) | ***N=42 (SE=7.3, CI=36-55)*** |
| 2005 | 8477 km2 | 7x7 (13 Banff) | 4 | 173 | 41 | N=47 (SE=3.39, CI=44-60) | ***N=45.41 (SE=3.96, CI=41-52)*** |
| 2006 | 7639 km2 | 7x7 (19 Banff) | 4 | 160 | 86 | N=140 (SE=20.2, CI=107-159) | ***N=92.4(SE=17.0, CI=77-121)*** |

[1] Population estimate always includes dependent offspring.
[2] Bears including dependent offspring within the sampling grid and surrounding area during the sampling period

**List of Titles in the Alberta Species at Risk Recovery Plan Series**

No. 1 Maintenance and Recovery Plan for Western Blue Flag (*Iris missouriensis*) in Canada. (2002)

No. 2 Alberta Piping Plover Recovery Plan 2002-2004. (2002)

No. 3 Alberta Peregrine Falcon Recovery Plan 2004-2010. (2005)

No. 4 Alberta Woodland Caribou Recovery Plan 2004/05-2013/14. (2005)

No. 5. Recovery Plan for Ord's Kangaroo Rat in Alberta. (2005)

No. 6 Recovery Plan for Burrowing Owl in Alberta. (2005)

No. 7 Alberta Northern Leopard Frog Recovery Plan 2005-2010. (2005)

No. 8 Alberta Greater Sage-Grouse Recovery Plan. (2005)

No. 9 Maintenance and Recovery Plan for Western Spiderwort in Alberta 2005-2010. (2005)

No. 10. Alberta Piping Plover Recovery Plan 2005-2010. (2006)

No. 11. Recovery Plan for Soapweed and Yucca Moth in Alberta 2006-2010. (2006)

No. 12. Alberta Trumpeter Swan Recovery Plan 2005-2010. (2006)

No. 13. Alberta Shortjaw Cisco Recovery Plan 2006-2011. (2007)

No.14. Alberta Swift Fox Recovery Plan 2006-2011. (2007)